Self Dialysis

a training manual for patients at home or in a facility

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The Health Care Financing Administration was established in March 1977 to combine HEW's health financing and quality assurance programs into a single agency. HCFA is responsible for the operation of the Medicare and Medicaid programs, the Professional Standards and Review Organization program, Federal survey and certification efforts, and a variety of other health care quality assurance activities.

The mission of the Health Care Financing Administration is to promote the timely delivery of appropriate, quality health care to its beneficiaries—approximately 45 million aged, disabled, and poor Americans. HCFA is committed to making beneficiaries aware of the services for which they are eligible, promoting the accessibility of those services and ensuring that HCFA policies and actions promote efficiency and quality within the total health care delivery system.

Description of office issuing Publication . . .

The mission of the Health Standards and Quality Bureau (HSQB) is to direct activities to assure that health care services provided under Medicare and Medicaid are furnished economically consistent with recognized professional standards of care. To help carry out this mission, the Division of Hospital Services (DHS) in the Office of Standards and Certification (OSC), develops, implements and monitors health quality and safety standards and other health care policies for hospitals and end-stage (ESRD) facilities; reviews and analyzes existing standards and guidelines to determine their effectiveness and impact on utilization, quality and cost of services; and develops and implements programs to assure that beneficiaries receive efficient and quality health care.

Description of Publication . . .

Self-dialysis Manual

This Self-Dialysis manual was developed to provide the ESRD patient with a useful resource and guide to performing a safe dialysis in either the home or dialysis facility. The manual, which is designed to be an important component in teaching self-dialysis, required the judicious input of a variety of professional disciplines. The manual also provides the ESRD facility staff as well as the patient and their families with a bibliography of educational materials on the various aspects of ESRD therapy.

Self Dialysis

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SELF DIALYSIS

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ACKNOWLEDGMENTS

The development of any educational tool and particularly one which has to do with the self training of an individual under the stress of a chronic life-threatening illness must be done with a great deal of sensitivity toward the diverse physical, social, emotional and environmental needs of such a patient. A manual which is designed to be an important component in teaching self-dialysis requires the judicious input of a variety of professional disciplines, the orderly arrangement of the units to be used, an appealing format, a careful assessment by a selected group of trainers and trainees and the impartial observation of a variety of readers while the manual is in preparation. Thus, this manual could not have been prepared by the System Sciences project team alone. It is impossible to mention by name every individual who contributed to this effort and particularly the patients and their aides used in the training sessions who sensitively expressed or recorded their reactions to practically every sentence in the manual. Like Abou-Ben-Adhem, their names must head all the rest and to them we are deeply grateful.

Several professionals who made significant contributions to this manual should be mentioned. The contributions of our two educational consultants, J. Arch Phillips, Ph.D., Chairman, Department of Curriculum and Instruction, Kent State University and Francine Hekelman, R.N., M.A. a doctoral candidate in education in the same institution, were of special significance. The self-training of patients in technical medical skills requires singular educational insights in a rather virgin field and these two dedicated consultants provided these beyond measure.

The guidance given by the Ad Hoc Advisory Committee, a knowledgeable interdisciplinary group which included an active home dialysis patient was especially helpful in keeping the manual at the desired level of clarity and usefulness. They provided valuable materials, a wealth of experience and a refreshing amount of candor. The members and their affiliation follows:

- Carmella Bocchino, R.N. (Peritoneal Dialysis)
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It is also to be noted that this committee not only functioned as a group but the majority of these individuals helped in the preparation of specific assignments as noted besides their names.

One of the most important considerations in the preparation of the Manual had to do with its testing and utilization at the six selected sites of training. Without the magnificent cooperation of the staffs of these institutions, especially the nurse coordinators who spent incredible numbers of hours meticulously and patiently going over each segment of the manual, it would not have been possible to assess the validity and credibility of this document. The institutions, the physicians and the nurse coordinators were as follows:

- Miami Valley Hospital, Dayton, Ohio
  H. Allen Feller, M.D.
  Deborah Eulberg, R.N.
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  Anthony Zappacosta, M.D.
  Susan Perras, R.N.

The project also wishes to acknowledge the efforts of Mr. George Williams who was responsible for the illustrations, as well as the contributions of our secretarial and report preparation support of Ms. Sandra Gosbee, Ms. Cynthia Dwyer, Mr. Paul Kennedy and Ms. Carolyn Doekel. Their dedication and attention to detail made it possible for this large volume of material to emerge into an attractive and manageable manual.

Two other persons who gave invaluable aid must be mentioned. Ms. Margaret Hess, R.N., technical consultant to System Sciences, Inc. reviewed the procedures for accuracy and clarity, while Ms. Carole Robbins Myers, a home hemodialysis patient critiqued from the point of view of the patient, the whole manual, particularly the segment entitled "Living With Dialysis."

Finally the project director must commend the project team members on their perseverance, adherence to schedule and maintenance of a high standard of quality. This applies in a most exceptional manner to Ms. Nancy Sharp, R.N.

Ms. Sharp's knowledge of the field, her willingness to seek out and use the expertise available, and her own high standards of dedication and professionalism have helped make this manual a significant contribution to improved patient care and education. She is the principal author of this manual.

Paul B. Cornely
Paul B. Cornely, M.D., Dr.P.H.
Project Director

Katharine A. Robbins, B.A.
Nancy J. Sharp, R.N., M.S.N.
Mark C. Wolff, Ph.D.

UNFORGETTABLE QUOTES FROM PATIENTS

"I have a dialysis machine and have been vacationing in central New York State for the last five months.

We have not encountered any problems which we couldn't cope with because of the wonderful job our teacher did teaching us."

A Home Hemodialysis Patient from Florida

"I have discovered that I know myself and the machine so well that I can do a great deal of fine and frequent tuning in regard to my negative pressure and TMP.

I adjust the TMP frequently depending upon how I feel and what my blood pressure is doing. I almost always come out exactly on the nose at my dry weight. Nurses, of course, can't be expected to fiddle with the dials with each patient."

An In-Center, Hemodialysis Self-Care Patient from Ohio

"CAPD is the greatest thing that happened to me. I can't wait to get on with life. It got so bad. It was a real effort to get up in the morning. Now I wake up happy. I have hopes for the future."

A CAPD Patient in California

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CHAPTER 1 -- INTRODUCTION

UNIT 1 -- TO THE READERS

To Patients Starting on A Self-Dialysis Program

This manual was produced to assist you in learning how to dialyze yourself as well as to offer helpful information on how to deal with some of the problems which may arise. The teaching staff of your dialysis unit will use the manual during your training sessions. All of the information to be learned will be reviewed until you are comfortable and capable of performing self-dialysis at home or in your dialysis unit.

To Families and Friends

This manual was written to be a guide to assist patients to perform a safe dialysis. It is intended that the patient should take the major responsibility for the treatment.

Your love and concern, as well as your patience and support are extremely important in helping the patient build confidence for this new responsibility.

It may be difficult to learn how to assist the patient with dialysis and not take it over yourself. There will be adjustments needed on both sides, but it will give the patient a greater feeling of self-worth if the responsibility for the dialysis treatment rests with the patient.

This may be extremely difficult for patient's families and friends to do, but we need to think of what's best for the patient. The staff at the dialysis unit will provide suggestions to help you cope with daily activities.

To Staff of A Self-Dialysis Unit

We hope this manual will provide you with a useful resource in your self-dialysis program. It should be used along with other teaching materials you have in your unit.

It is the nurse-educator's responsibility to plan the dialysis patient's program with specific instructional strategies for each patient. The nurse-educator will provide all the material and information in a sequence which suits each patient.

UNIT 2 -- THE TREATMENT OPTIONS FOR KIDNEY FAILURE

Review of Treatment Options

The choice of which treatment option is best depends on different reasons for different people. You have already been involved in making the decision to go on some form of self-dialysis as you begin instruction using this manual.

Some of you may move from one mode of treatment to another as your needs change from time to time. You are encouraged to ask your doctor about the options available to you.

The diagram on the following page shows that the three options for treatment of kidney disease are:

- Hemodialysis
- Peritoneal Dialysis
- Kidney Transplantation

For dialysis, either hemodialysis or peritoneal dialysis, there are two options of location:

- In your home
- In a dialysis unit

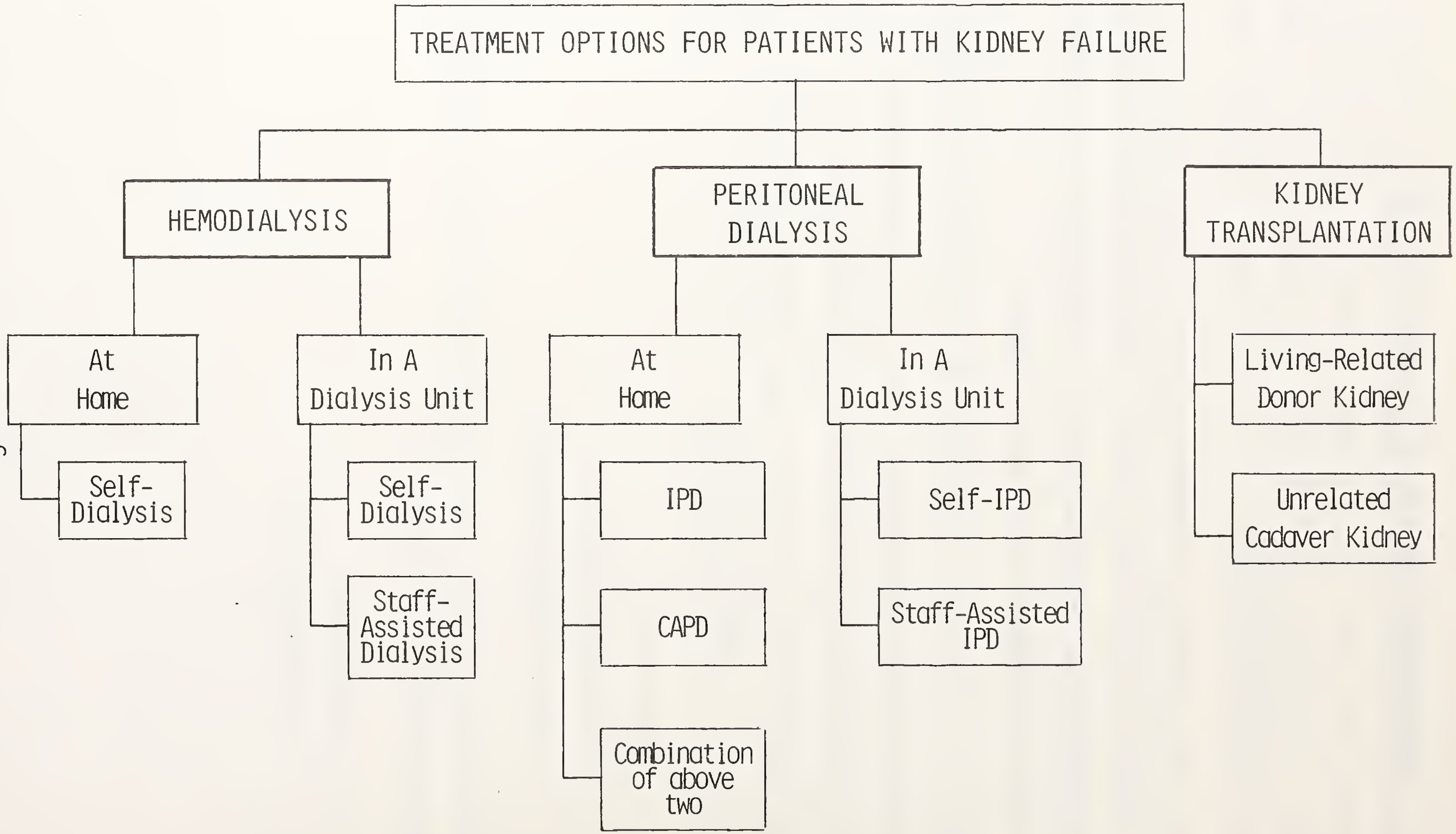
TREATMENT OPTIONS FOR PATIENTS WITH KIDNEY FAILURE
HEMODIALYSIS
PERITONEAL DIALYSIS
KIDNEY TRANSPLANTATION
At Home
Self-Dialysis
In A Dialysis Unit
Self-Dialysis
Staff-Assisted Dialysis
At Home
IPD
CAPD
Combination of above two
In A Dialysis Unit
Self-IPD
Staff-Assisted IPD
Living-Related Donor Kidney
Unrelated Cadaver Kidney

Figure 1

First Review of Terms

Dialysis is the word we use when referring to the treatments necessary for patients with kidney failure. Normally, water and waste products are removed from the body by the kidneys through the elimination of urine. When the kidneys are diseased, they cannot get rid of the waste products, so dialysis treatments must be substituted. There are two kinds of dialysis:

1. Hemodialysis
2. Peritoneal Dialysis

Hemodialysis is a technical procedure that removes excess water and waste products, such as urea (a breakdown of protein), which have accumulated in the bloodstream of the patient. The blood is shunted from the blood stream and is filtered through an artificial kidney made of special plastics and cellophanes.

Peritoneal dialysis is another technical procedure which also removes excess water and waste products from the patient, but instead of using an artificial kidney to do the filtering, it uses the person's own peritoneal membrane (a thin lining in the abdomen) to do the filtering.

IPD or Intermittent Peritoneal Dialysis usually refers to peritoneal dialysis scheduled on an every-other-day schedule for a 6 to 12 hour procedure.

CAPD or Continuous Ambulatory Peritoneal Dialysis usually refers to a continuous (24 hours, 7 days a week) dialysis procedure.

There are other variations possible in combining the two above. All of these terms will be discussed in much greater detail in later chapters.

Kidney transplantation is the third option for patients with kidney failure. Transplants from a related donor are performed by surgically removing a functioning kidney from a relative and implanting it into the abdomen of the person with kidney failure. Unrelated cadaver kidneys are transplanted to persons with kidney failure also. These kidneys are obtained by a kidney transplant team immediately after a donor's death.

Since the emphasis of this manual is on self-dialysis training, there is only this brief mention of transplantation. Your own doctor will explain how you may be considered for a transplant if you wish. Your dialysis training staff will have additional reading material for you to consider.

UNIT 3 -- HOW TO USE THIS MANUAL

Introduction

This Self-Dialysis Training Manual is only one of the tools that will be used by the staff of your dialysis unit as you begin your training program. You will be working very closely with the training staff of the unit as they guide and teach you. They will be using the Operator's Manuals for your specific dialysis equipment as well as slides, tapes, posters to help you learn.

All of this manual is written to you, the patient, who will be performing self-dialysis. You, along with the dialysis unit staff, will determine how much responsibility you will assume for self-dialysis.

Four Major Sections

1. Self-Dialysis Training Program: General Information
2. Basic Training Manual
3. Sample Technical Procedures
4. Index/Glossary and References

All patients entering a training program will receive Sections 1. Self-Dialysis Training Program: General Information, and 4. Index/Glossary and References.

If you are going on hemodialysis, your training nurse will give you the hemodialysis material from Section 2. Basic Training Manual, and Section 3. Sample Technical Procedures.

If you are going on peritoneal dialysis, your training nurse will give you the peritoneal dialysis material from Section 2. Basic Training Manual, and Section 3. Sample Technical Procedures.

Whichever type of dialysis training program you are starting, your training nurse will pull out your daily or weekly assignments, and you will begin by reading the material. You will then discuss the material with your nurse, answer the questions your nurse asks you, and when both you and the nurse are comfortable that you have mastered the material you will move on to the next lesson.

Helpful Tools: Glossary, Index, Check-Yourself

The glossary is a list of new words and their meanings. The index will point out page numbers for the new material in the manual. These are provided to explain new words and terms you will be learning.

In addition, there is a short self-help tool at the end of most units, called "Check-Yourself." If you are having difficulty with the questions, just reread the material and ask someone on the staff for help.

UNIT 4 -- WHO TO CALL

Someone from your dialysis unit staff may be available twenty-four hours a day. They will insert their telephone numbers below so you can reach them as needed.

When the dialysis unit is open, call:

____

____

____

When the dialysis unit is closed, call:

____

____

____

<u>UNIT 5 -- PROFILE OF THOSE WHO HELP</u>

<u>The Renal Team</u>

The primary group of people involved in the renal team are the following:

- You, the self-dialysis patient
- Your dialysis helper or assistant
- Your doctor(s)
- Your dialysis nurses
- Your technician
- Your dietitian
- Your social worker

Some dialysis units may have their own social workers and dietitians. Other units will share the services of a social worker and dietitians on a part-time or consultant basis.

There are many other people needed to run a dialysis unit. You will be introduced to them at your unit and they are all available to assist you with your needs on self-dialysis.

<u>The doctor(s)</u> are the persons who will help you with your medical problems. They may be called nephrologists because of their special training in kidney disease. They will decide your prescription for dialysis as well as your diet and medications. They are the persons responsible for seeing that you get the maximum benefit from dialysis.

The nursing staff is made up of registered (RN) and licensed practical or licensed vocational nurses (LPN's and LVN's). The nurses working with you in self-dialysis training will have special education and interest in teaching. They will design a training program suited to your needs. You may have one nurse assigned to you called your primary nurse.

The technicians are persons who handle many of the technical aspects of dialysis. Some technicians have special education in understanding the mechanical workings of the dialysis equipment and may be involved in some of the aspects of your training.

The social worker's role varies from unit to unit. On some units, the social workers will do most of the footwork to get your Medicare status straight as well as handle other financial problems. On other units, they work as patient counselors and are coordinators of patient group meetings.

Dietitians will help you choose a nutritious and palatable diet, keeping your likes and dislikes in mind. The dietitian will work out a plan with the doctor's prescription for dialysis as well as your laboratory results. This is done in addition to making a full nutritional assessment.

Your Helper or Assistant is the person (or persons) who is involved in helping you perform self-dialysis. If you are on self-dialysis at home, your assistant may be a member of your family. If you are on self-dialysis in a dialysis unit, some of the unit's staff members will be assisting you.

Your Support System

All of these people, plus many others who help, are generally called your support system. They are the people who care about who you are and how you are doing. They are there to assist you when you need them. They will teach you the mechanics of dialysis, how to manage your renal diet, and how to cope with the various insurance forms and procedures. They will offer guidance and counseling when you are afraid and feeling all alone. They will offer encouragement when the going gets tough. Most of all, they will teach you and guide you, so that you will learn that the tasks of self-dialysis are manageable and that you will be able to fit dialysis into your life as a part of your ongoing activities with your family, friends and work. They will try to assist you to cope with the problems and offer alternative approaches to you when required. Don't hesitate to reach out to them when you need them.

Your greatest support may come from your family, friends, church, and neighbors. You are part of their life and they are part of yours. Do not block them out. They can help you when you need them.

UNIT 6 -- SCHEDULE OF TRAINING PROGRAM

The staff of your dialysis unit will insert your training schedule here.

SAMPLE FOR HEMODIALYSIS

DAY 1	DAY 2	DAY 3
Introduce to unit, staff, and self training program. Introduce to Manual, audio-visual aids, recordkeeping. Review access care. Observe dialysis procedures: Starting (Going on) Monitoring Completing (Coming off)	Review diet and medications. Learn to take TPR, BP and weight. Learn clean and aseptic technique. Introduce needles, syringes, solutions. Draw-up heparin loading dose. Learn basic parts of machine.	Observe setting up of machine. Observe fistula veni-puncture. Complete dialysis flow sheet for monitoring. Learn alarms and safety checks. Assist with coming-off procedures.

DAY 4	DAY 5	DAY 6
Study normal renal function and problems with renal failure. Study functions of the artificial kidney. Set up machine. Learn to set negative pressure and conductivity meter.	Set up machine. Make veni-puncture. Set negative pressure. Check conductivity. Monitor dialysis, completing dialysis flow sheet. Come off dialysis with assistance.	Set up machine. Start dialysis. Make veni-puncture. Monitor dialysis. Do chloride test. Come off dialysis.

SAMPLE FOR INTERMITTENT PERITONEAL DIALYSIS (IPD)

(sample uses automatic peritoneal cycling machine)

DAY 1	DAY 2	DAY 3
Introduce to unit, staff, training program, record-keeping. Learn to take TRP, BP, and weight. Watch set-up. Watch connection procedure. Watch disconnection procedure. Watch sterilization.	Do set-up. Watch connection procedure. Practice gloving. Discuss kidney disease and normal function of kidneys. Practice handling on-off tray and patient tubing. Watch disconnection procedure. Watch sterilization.	Do set-up. Do connection with assistance. Practice gloving. Practice handling on-off tray. Discuss principles of dialysis. Interview with dietitian. Discuss alarm system. Do disconnection with assistance. Do sterilization with assistance.

DAY 4	DAY 5	DAY 6
Do set-up without assistance. Do connection without assistance. Review alarm system. Discuss medications. Monitor self on dialysis. Review sterile technique and dressing change. Do disconnection without assistance. Do sterilization without assistance.	Do set-up without assistance. Do connection without assistance. Review all training up to now. Learn to take cultures. Discuss complications (medical and technical). Oral review and evaluation with instructor. Do disconnection without assistance. Do sterilization without assistance.	Do all procedures without assistance. General review. Evaluate total training.

SAMPLE FOR CONTINUOUS AMBULATORY PERITONEAL DIALYSIS (CAPD)

DAY 1	DAY 2	DAY 3
Observe staff starting dialysis. Read introductory material. Observe staff doing dressing changes.	Observe exchanges. Discuss why you are on CAPD. Identify supplies used. Review terminology.	Observe exchanges and catheter care. Discuss introductory material: Physical principles How the kidneys work How CAPD works Initial discomforts Common complications Signs of infection

DAY 4	DAY 5	DAY 6
Observe first exchange of morning. Review principles of sterile technique. Practice simulated catheter care and exchange procedure. Do final exchange of day with staff observing you.	Observe first exchange of morning. Review signs of infection. Perform remaining exchanges unassisted. Discuss renal diet. Discuss medications. Discuss record-keeping.	Perform first exchange of morning. Perform remaining exchanges unassisted. Discuss clinic follow-up and home visits. Identify long-term problems.

UNIT 7 -- INTRODUCTION TO THE SELF-DIALYSIS TRAINING PROGRAM

Self-Dialysis Training

The training sessions are provided in a dialysis facility that has a training unit. You and your assistant, if you need one, will be taught by a nurse and technician who have spent time in learning how to teach self-dialysis. Some dialysis units train on your dialysis days as well as the days you are not on dialysis. The staff of your dialysis unit will individualize the program so that it can be adjusted to your needs.

You are scheduled to begin ________________________ (Hemo or Peritoneal) training on ________________________ (Date). The training usually lasts from ________ to ________ weeks.*

In the training sessions the staff will teach the procedures one step at a time until you and/or your assistant or partner learn the techniques. They will use this manual along with the manufacturer's instructions adapted for their unit. They may also use slides, movies, TV tapes, drawings, and demonstrations to help you learn.

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* Your dialysis unit staff will fill in appropriate words for you.

Training for Hemodialysis

Basically, what is taught during the dialysis training is how to use the equipment. It appears very complicated at first, but you may find it quite easy to learn. In fact, the ability to learn self-dialysis does not seem to be related to the amount of education you have or even to the ability to read or write. It depends on your interest in learning.

A. First, you will learn the material that has to do with taking care of yourself, such as reviewing your renal diet and medications for the treatment of your kidney disease. You will learn basic procedures such as how to check your blood pressure, pulse and temperature. You will learn how to carry out sterile technique, and apply this to caring for your access as well as the dialysis procedures.

B. Second, a basic course on the operation of the dialysis machine will be taught by the staff. You will learn how to start and stop the dialysis procedure. You will be taught how to recognize and solve problems that arise with the machine while you are on dialysis. You will learn what to do in an emergency.

Training for Peritoneal Dialysis

For peritoneal dialysis, the training program may be shorter. Your dialysis staff will provide you with your schedule.

A. You will learn basically the same material for hemodialysis patient learns as far as kidney disease itself, its treatment, and its complications. The medications may be similar. Diet and fluid restrictions may not be as strict. This depends on which type of peritoneal dialysis you choose as well as your physical condition.

B. If you are going to be on intermittent peritoneal dialysis (IPD), you may need instruction on how to run an automatic cycling machine. Intermittent means to start and stop the procedure and come off dialysis as scheduled by your doctor.

C. If you are going to be on continuous ambulatory peritoneal dialysis (CAPD), you will learn how to make your exchanges as you remain ambulatory and go about your daily activities.

D. Some dialysis unit staff are designing peritoneal dialysis schedules which are combinations of the above two methods. Some terms used are:

PDPD -- Prolonged Dwell Peritoneal Dialysis, and
CCPD -- Continuous Cycler Peritoneal Dialysis.

There will surely be other variations in the future.

UNIT 8 -- MEDICARE AND OTHER RESOURCES

Most patients who are on dialysis or have had a kidney transplant are eligible for Medicare benefits, which will usually pay for most of the medical bills. Medicare is a health insurance program that is available under Social Security to help the American people to pay the expenses of health care.

There are two booklets published which offer helpful information regarding Medicare. Most of the information in this chapter is taken from these two booklets, but you may want to obtain your own copies if you don't already have them. Ask your local Social Security office or your Social Worker for them:

1. Your Medicare Handbook. HEW Publication No. (SSA) 79-10050.

2. Medicare Coverage of Kidney Dialysis and Kidney Transplant Services. A Supplement to Your Medicare Handbook. HEW Publication No. (SSA) 75-10128.

New legislation passed in October of 1978 has changed some of the reimbursement policies of Medicare. Further revisions of these booklets will reflect these changes.

As soon as you know you are going to need chronic dialysis, you should apply for Medicare at any Social Security office.

Medicare consists of two parts:

- Part A -- Hospital Insurance
- Part B -- Medical Insurance

Part A -- Medicare Hospital Insurance pays for three types of services:

1. In-patient hospital care.
2. In-patient skilled nursing home or rehabilitation center care (if medically necessary, following a hospital stay).
3. Some home health care services.

Part B -- Medicare Medical Insurance pays for doctors' services and a number of things not covered by Part A. It pays 80 percent of out-patient dialysis. You have to sign up for this part and pay a monthly payment. It is extremely important that you do sign up for Part B since it covers the following services:

1. Out-patient Maintenance Dialysis.
2. Transplantation Physician Services.
3. Self-Dialysis Training.
4. Home Dialysis Equipment and Supplies.
5. Home Dialysis support services under certain conditions.

When Medicare Benefits Begin (Entitlement)

Under the ESRD provisions of the law, Medicare benefits begin on the first day of the third month after a regular course of maintenance dialysis has begun and eligibility for benefits under the program has been established.

Examples

Date Course of Dialysis Initiated	Waiting Period	Date of Entitlement
January 1	January 1 - March 31	April 1
January 15	January 15 - March 31	April 1
January 31	January 31 - March 31	April 1

Important Waivers

It is important to note that the waiting period may be waived if you start self-dialysis training (at an approved training facility, during the qualifying period) and expect to complete training and then self-dialyze thereafter.

Also, the waiting period may be waived if you are hospitalized for a transplant (at an approved transplant center, during the qualifying period) and the transplant takes place no later than two months after hospitalization.

Important Point

A point to be emphasized is: ANY PATIENT ENTITLED TO MEDICARE ESRD COVERAGE IS AUTOMATICALLY ELIGIBLE FOR ALL MEDICARE BENEFITS. This means that you are not restricted to the special benefits covered by the ESRD provisions, but rather, have full Medicare program coverage, regardless of your age.

Dialysis Treatment Costs

The dialysis that you might have had as an in-patient is very expensive. After you have been stabilized and are referred to an out-patient dialysis facility (usually called a "limited-care" facility), the charge for dialysis is less. Self-dialysis, either at home or in a dialysis unit, further reduces the cost. The charges for dialysis do vary throughout the country and even from one dialysis facility to another.

Equipment and Supplies

Medicare can reimburse a dialysis facility 100 percent for equipment for self-dialysis at home as of October 1, 1978. Medicare also covers 80 percent of the cost of all supplies used to do self-dialysis at home. Effective April 1, 1979, an approved facility may choose to supply all necessary equipment, supplies and support services to patients at home under a prospective reimbursement rate. Also, the three-month waiting period for eligibility to Medicare is waived when you go straight into self-dialysis training.

Further Help

If your Medicare benefits are not clear to you, ask your social worker to assist you to obtain further information.

Other Sources, Besides Medicare, That Are Available To Help With The Expenses of Dialysis*

1. Private insurance. The benefits vary between in-patient and out-patient coverage, so check your policy with the insurance agent.

2. Medicaid, for those who qualify.

3. Some county hospitals provide dialysis services.

4. Veterans may be able to receive dialysis at a Veterans Administration Hospital.

5. Kidney Foundations in some states may be able to offer help or direct you to other agencies who can help.

6. State Kidney Disease Programs or Kidney Commissions.

7. Check with your renal social worker or a financial assistant at the dialysis unit to help you with the following services if you need to:

    - Aid to Families with Dependent Children
    - Food Stamp Programs
    - Supplemental Security Income (SSI)
    - State Supplementary Assistance Program
    - Social Security Disability Income

*It might be helpful to go through the phone book now and jot these numbers down for future reference.

- Private Disability Income Insurance
- County Relief
- Local Church Related Services

Agencies Available To Help The Dialysis Patient

Each state and county has different resources, so it will be necessary for you to check these resources out with your renal social worker:

- Visiting Nurse Association and/or Public Health Nursing Association
- Home Health Agencies
- Community Mental Health Centers
- State Health Departments
- State Vocational Rehabilitation Departments
- Easter Seal Society for Crippled Children and Adults
- Legal Aid Societies

Transportation Services

Red Cross Transportation Services

Each Red Cross Chapter has a different transportation policy. Many Chapters offer transportation services of some kind for dialysis patients and for people who need transportation to a physician, a clinic, or other treatment center. In most cases, the hours of operation for each Chapter are

such that they can offer only one-way transportation to dialysis shifts. These volunteer services do not usually operate on a 24-hour basis, but you may at least be able to get a ride one way to or from the dialysis unit.

For more information, you should contact the Red Cross Chapter located in your area.

Private Van Transportation

Some cities have set up private transportation systems that are equipped to handle wheelchairs. They may have fees set for both one-way trips and round-trips. Some companies provide additional attendants to assist patients who need to be carried to the van, or up and down stairs. This expense is not covered by Medicare, but may be covered by your State's Medicaid program.

Public Bus Transportation

Some cities have offered ID cards for dialysis patients to ride at half-fare. Call your local bus transportation company to check on this.

Organizations

American Kidney Fund

7315 Wisconsin Avenue
Washington, D.C. 20014
(301) 984-1444

The American Kidney Fund is a non-profit national voluntary organization. The main focus of the American Kidney fund is to provide direct financial assistance to persons with kidney disease. To be eligible for this aid, applicants first must have exhausted all other possible sources of assistance; then the patient, social worker, and physician must complete applications for this aid. Assistance is provided in the following areas (although other types of financial assistance associated with kidney disease may be considered):

- Home dialysis supplies
- Medications
- Transportation expenses
- Special dietary requirements

The American Kidney Fund also provides free of charge to the public a large variety of pamphlets dealing with such subjects as kidney disease, artificial kidney machines, transplantation, and Medicare.

National Association of Patients on Hemodialysis and Transplantation, Inc. (NAPHT)

505 Northern Boulevard
Great Neck, New York 11201
(516) 482-2720

NAPHT is a patient organization with approximately 8,000 national members and a number of local chapters. It educates both the public and patients about kidney disease, care modalities, and rehabilitation.

Among its patient services are a children's camp (jointly sponsored with the Ruth Gottscho Foundation) at the Frost Valley YMCA Camp in the Catskill Mountains; a list of dialysis centers worldwide which accept traveling patients; NAPHT NEWS, a quarterly magazine for renal patients; and other publications of interest to renal patients.

The Kidney Foundation

2 Park Avenue
New York, New York 10016
(212) 889-2210

The National Kidney Foundation is a non-profit organization. There are 56 regional affiliates of the National Kidney Foundation which is based in New York. Among the services provided in local affiliates are:

- Patient newsletters
- Patient-family seminars

- Patient picnics and trips
- Drug bank programs
- Vocational rehabilitation services
- Publications dealing with kidney disease
- Audio-visual materials on kidney disease
- Emergency fund for patients

The Foundation also supports research and research training, continuing education of health care professionals, and public education.

Additional Resources

Federal Rent Subsidy

The Federal government provides funds to local governments to subsidize the rental costs of disabled persons or those on limited incomes. Qualifications and requirements vary with each local government. If approved, the applicant may receive up to 75 percent of his rent in his present domicile or any approved development. This is not public housing, but applies to any private development that agrees to the subsidy and meets the requirements. For further information call your local Section 8 Housing Authority.

Medic Alert

Medic Alert is an organization that offers for a nominal fee either a necklace or bracelet with the wearer's medical problems and identification number engraved on the back. Medic Alert maintains a 24-hour, 7-day-a-week telephone service that has on file more detailed information about the member's medical problem and who to contact (doctor and family). Whenever a person cannot speak for himself/herself in a medical emergency, Medic Alert speaks for them. To obtain an application, write to:

Medic Alert
P.O. Box 1009
Turlock, CA 95380

Library Services

Talking book phonographs and cassette recorders are available through your state library system. For an application and the location of your state's center, write:

The National Library Services for
the Blind or Physically Disabled
Washington, D.C. 20542

or call the Library of Congress at (202) 882-5500.

As you can see, there are many resources* to help kidney patients. Some are set up to help kidney patients specifically. Some of the others are set up to help anyone who meets the eligibility criteria.

With inflation as it is now, it is difficult for everyone to make ends meet. For those persons with chronic disease, and all the expenses of treatment, it is even harder. The programs available were created to help you. Either you or your social worker can make the initial contacts with them and get the details on how to apply.

Some times it is embarrassing to ask for help from an agency. Remember, however, that many of these programs are supported directly or indirectly by tax money. We have all made contributions to these funds by paying our taxes, so that these programs will be there to help us when we need them.

---

* Resources listed starting with Transportation Services adapted from: Phyllis Luckenbaugh (Editor). Patient Information Booklet on Kidney Disease. Chevy Chase, Maryland: End-Stage Renal Disease Network of the Greater Capital Area, Inc. (#23), June 1980.

CHAPTER 2 -- LIVING WITH DIALYSIS

Review of Dialysis

To review what the process of dialysis means, we stated earlier that dialysis is the word we use to refer to kidney treatments. Dialysis is an accepted treatment for patients with kidney failure. A diagram of the process of dialysis is shown below.

Hemodialysis is the procedure used to filter the patient's blood through a filtering device made of a special type of cellophane. The special cellophane has very small holes in it, so that it can be called "semi-permeable." This means it will allow some small particles through, but it will hold others back. Both the blood cells and the germs are too large to pass through the small holes.

PRINCIPLE OF DIALYSIS

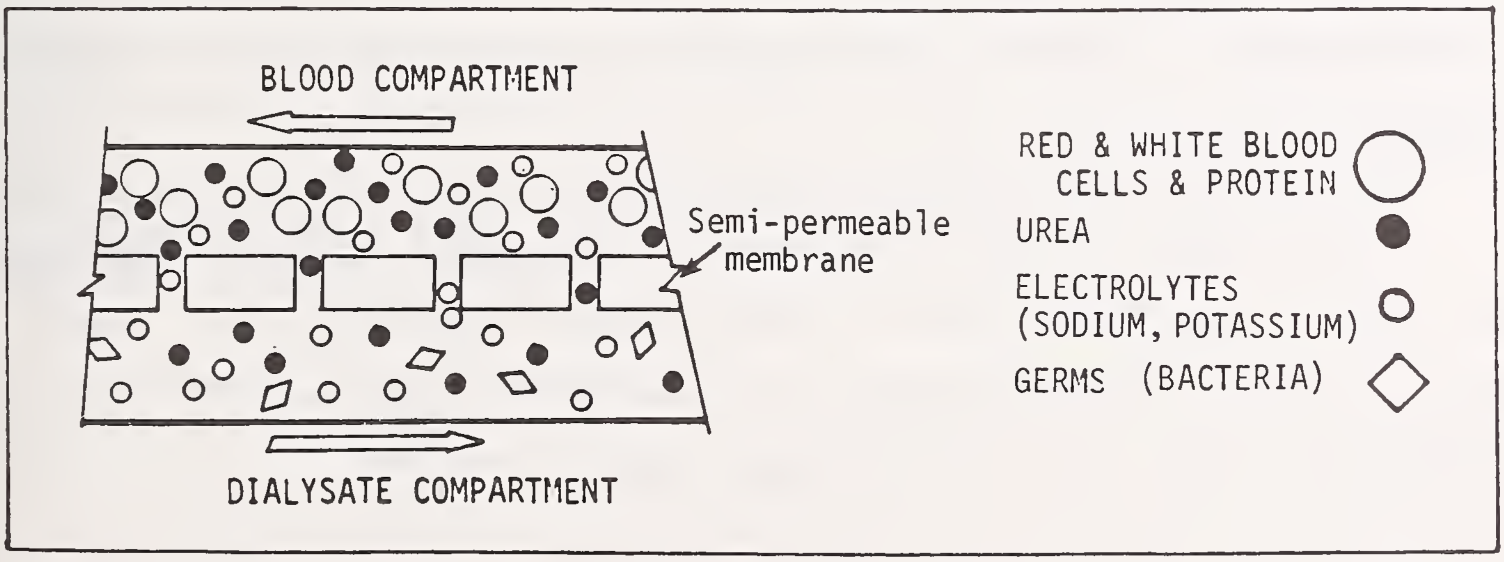


Figure 2

In Peritoneal Dialysis, the patient's own peritoneal membrane (a thin lining in the abdomen) is used as the filtering device, but the same process occurs.

Self-Dialysis (In a Center or At Home)

Self-dialysis means you assume the major responsibility for your own dialysis, and seek whatever assistance you need. Self-dialysis means that you will assume responsibility for deciding what to do to carry out the dialysis procedures.

You and your assistant (if you need one) will go through training sessions which will review basic information and skills required to perform a safe dialysis. You will not "graduate" until both you and your teacher are comfortable with the fact that you can dialyze yourself safely.

You may become totally independent some day, but for right now, it is important that you learn to do each step well, one at a time. You will have enough time to practice before you do it alone. Remember that each person learns at a different rate and you should not get discouraged if you are not progressing at the same rate as someone else.

As time goes on, you will build up confidence from the experience and will perhaps be able to take on more responsibility. Your ability to grasp these procedures will be measured daily with the training nurse who will help you each step of the way.

Self-dialysis may be carried out in the following places:

1. In your home,
2. In a part of a regular staff-assisted dialysis unit,
3. On a special shift in a staff-assisted unit.

Reasons For Doing Self-Dialysis at Home

Patients who are presently on self-dialysis at home mention several advantages, such as:

- Arranging their own time schedule,
- Being in their own home,
- Having some savings in terms of gas and transportation time,
- Being responsible for their own treatment, which increases their feelings of independence.

Patients who are responsible for their own dialysis treatments in a dialysis unit also mention the advantage of feeling independent. In either case, being in control of the part of your life that involves dialysis also gives you more freedom to plan activities for the other parts of your life. Many patients on dialysis are able to enjoy normal activities of daily living and do cope well with kidney disease.

Parts of the Self-Dialysis Process

There are several parts to the dialysis process and these can be divided into small steps. You will assume responsibility to see that all tasks are accomplished, but you may direct an assistant to do some of the steps of the procedure.

The full sequence of dialysis (both hemodialysis and peritoneal dialysis) is:

1. Pre-dialysis preparation,
2. Starting or "going-on" procedures,
3. Monitoring or supervising procedures,
4. Completing or "coming off" procedures,
5. Post-dialysis care,
6. Clean up of equipment.

Pre-dialysis preparation may include the following:

1. Preparing the dialyzer or other equipment according to your dialysis unit's instructions,
2. Taking and recording weight, blood pressure, pulse, and temperature,
3. For hemodialysis, preparing the arm or leg with the vascular access,
4. For peritoneal dialysis, preparing the abdomen and the peritoneal catheter.

Starting and Completing Dialysis

Samples of procedures involved with starting and completing dialysis are given in the procedures sections with separate ones for hemodialysis and peritoneal dialysis. Your dialysis staff will point out which ones are appropriate for you, or they will insert their own procedures. (See Section Three.)

Monitoring Dialysis

You will be doing other procedures while on dialysis to check on your progress. Examples of these are Blood Pressure (see page 75), Clotting Times (see page 81).

Post-dialysis care may include the following:

1. Applying the appropriate dressing to the access (either access to the blood stream or access to the abdomen).
2. Taking and recording weight, blood pressure, pulse, and temperature.

NOTE: Before you start the actual dialysis procedure, you will set up your equipment or machine according to your dialysis unit's instructions. After the actual dialysis procedure, you will disassemble the equipment or machine according to your unit's procedures.

Self-Dialysis at Home

As a self-dialysis patient at home (versus in a facility) you may be responsible for ordering and stocking your supplies. You will receive instructions about the order forms to complete from your dialysis unit staff. If they do not order directly, they are responsible for seeing that you are instructed correctly.

A home visit may be made by the dialysis staff to determine if electrical or plumbing modifications are needed in your home.

CHECK YOURSELF

Directions: Complete the following phrases. Check yourself with the answers on the next page when finished. If you did not choose the correct answers, go back and read the material again.

1. Hemodialysis is ______________________________

   ____

   ____

   ____

   ____

2. Peritoneal dialysis is __________________________

   ____

   ____

   ____

   ____

3. The full sequence of dialysis is:

   a. ____________________ d. ____________________

   b. ____________________ e. ____________________

   c. ____________________ f. ____________________

4. Thought question: What does self-dialysis mean to me?

   ____

   ____

   ____

ANSWERS:

1. a procedure to filter the patient's blood through a filtering device made of a special type of cellophane.

2. a procedure where the patient's own peritoneal membrane is used as the filtering device.

3. a. Pre-dialysis preparation,
   b. Starting or "going-on" procedures,
   c. Monitoring or supervision procedures,
   d. Completing or "coming-off" procedures,
   e. Post-dialysis care,
   f. Clean up of equipment.

4. Your own answer

UNIT 2 -- KIDNEY FAILURE AND THE NEED FOR DIALYSIS

The Three Main Functions of Healthy Kidneys Are:

- Keep the body's fluids in balance, by taking in water and other fluids and removing excess through elimination,
- Keep the body's chemicals, such as salt, in balance by holding on to some and removing excess through elimination,
- Remove waste products from the body.

The Urinary System Includes

The major parts of the urinary system are shown in the drawing below. There are many references available for further detailed reading. You are encouraged to read these if you are interested.

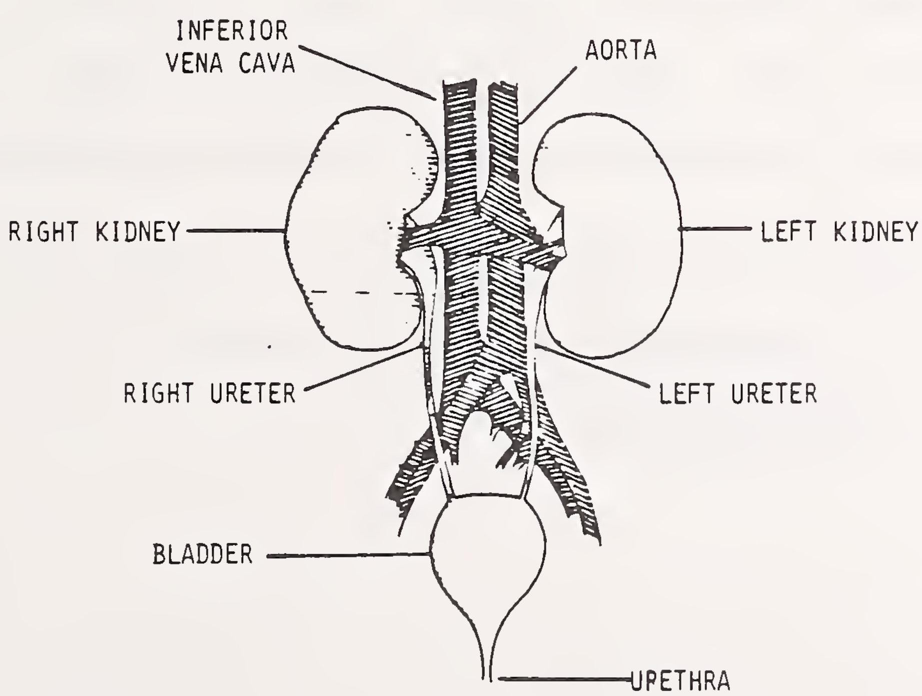


Figure 3

Kidney Failure

When the kidneys stop working, it is called kidney failure or chronic renal disease. Another term commonly used is end-stage renal disease (ESRD). This term means that the kidney disease cannot be reversed or cured.

Kidney failure is generally shown by a decrease in the amount of urine you produce, as well as an increase in waste products in your blood. Kidney failure may occur for several reasons. Kidneys can become diseased or damaged through infection, high blood pressure, blood vessel disease, diabetes, and/or other diseases. Your doctor may need to explain which particular disease caused your kidneys to stop working.

The disease process can be very gradual and you may have felt fine until the last few weeks or months. As your kidney failure has progressed, you have probably been on drugs to control your blood pressure and on a low protein and low salt diet to lessen the work the diseased kidneys have to do. When this treatment no longer works, you need to either start dialysis or have a kidney transplant.

It is possible that as you begin dialysis, you may still be making some urine. As the kidneys continue to fail, the urine may also stop. This is to be expected.

The Need for Dialysis

You need dialysis when your kidneys can no longer function to keep you safe. When your kidneys are not able to filter out the waste products as they should, you may feel quite ill with its effects, such as constant headaches, nausea and vomiting, and extreme fatigue. Dialysis is then needed to remove the waste products that have accummulated in your body.

Dialysis doesn't do anything to your own kidneys, nor is dialysis able to do everything your own kidneys could do. Dialysis with the artificial kidney is not a total replacement for the work your own kidneys did. Dialysis is only a partial solution.

CHECK YOURSELF

Directions: Answer the questions below. Check yourself with the answers on the next page when finished. If you did not choose the correct answer, go back and read the material again.

1. List the three main functions of the healthy kidneys:

   1)

   2)

   3)

2. Label the parts of the urinary system:

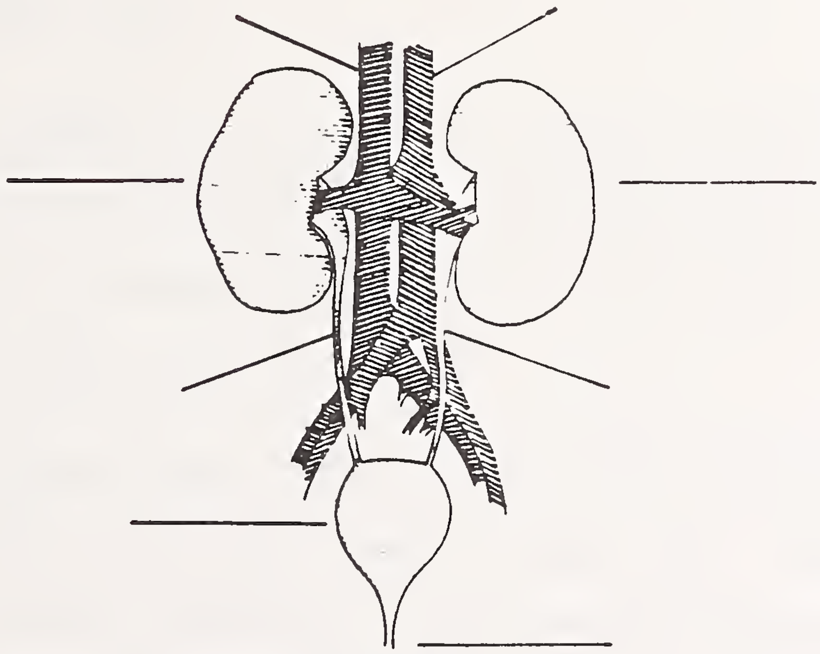


Figure 4

3. Thought Question: What is the cause of your kidney disease, as explained to you by your doctor?

____

____

____

____

____

ANSWERS

1. Keep fluids in balance, keep chemicals in balance, remove waste products.
2. Refer back to drawing on page 47
3. Your own answer.

UNIT 3 -- YOUR RENAL DIET

Basics of a Renal Diet

Basically a renal diet is one where the amounts of protein, sodium and potassium in the food must be watched rather closely. The fluids (or liquids) may also be limited.

The renal diet will be explained to you by a dietitian familiar with the dialysis process. The dietitian is responsible for calculating the correct amounts of food based on your doctor's diet prescription.

The Need for a Renal Diet

Since your kidneys are not able to control the blood levels of sodium, potassium, phosphorus, fluid and protein waste products, you will need to be careful about some of the foods that you eat that contain the above elements.

The dietitians at your dialysis unit will work with you to develop a palatable diet which tries to meet your likes and dislikes as well as your lifestyle. Your diet may also change from time to time as your condition changes.

Your current diet prescription is listed on the following page. The amounts will be filled in by the dietitian at your dialysis unit.

____________________ Gm. Protein

____________________ mg. or mEq. Sodium

____________________ mg. or mEq. Potassium

____________________ oz. or cc. Fluid

____________________ Calories

____________________ Other

1. <u>Protein</u> is needed for growth and repair of body tissues. Protein is needed every day since it is the basic building material for every living cell.

   Proteins can be classified into two major categories depending on the arrangement of the amino acids. Some amino acids are essential and some are not (non-essential). These proteins are then said to be of "high, biologic value" (HBV) or "low biologic value" (LBV). High quality proteins come from animal sources (meat, fish, poultry, eggs and milk) and contain all the essential amino acids in the right amounts and proportions. Low quality proteins come from plant sources (breads, cereals, vegetables) and lack some of the essential amino acids.

   <u>You will need to include both</u>. Three-fourths of your protein should come from HBV. This makes your renal diet more interesting. It is important that you eat enough protein, since you lose some protein during dialysis.

2. <u>Sodium</u> (Na) is present in most foods. "Na" is the abbreviation for sodium. Sodium is found in a high concentration in table salt, soda, and baking powder. Because sodium is present in many foods, it would be good for you to avoid very salty foods and table salt, since extra sodium is not desirable. On a regular diet with good kidney function your kidneys will get rid of all the extra

sodium. But when your kidneys do not work properly, you have to be very careful of how much sodium you eat. You need to start reading the labels on food packages so you can check the sodium content.

Sodium and water combine with one another. Sodium controls the fluid balance in your body and this affects your blood pressure. If your blood pressure goes up, this puts extra stress on your heart. If you have too much sodium in your body, you will feel thirsty and drink more fluids. This will cause parts of your body to swell and get puffy.

3. Potassium is a mineral that is needed by the nerves and muscles in your body. "K" is the abbreviation for potassium. Since the heart is a large muscle, the amount of potassium in your body will affect your heart beat.

   Potassium is found in practically all foods, especially fruits and vegetables. When the kidneys are working well the extra potassium is removed by your kidneys. When they are not functioning properly, the potassium in your blood begins to rise above the normal limits of 3.5 to 5.5 mEq. In order to control the potassium content of your diet you must learn which foods are high in potassium.

4. Fluid (or "water") in the diet includes water and anything which becomes liquid at room temperature, such as Jello,® soup, sherbert, ice cream and ice.

   Some fruits also contain a lot of fluid. Examples are oranges, grapefruit, watermelon, and cantaloupe. Also, if juices from cooked vegetables are eaten, they need to be counted in the day's limit.

   One of the kidneys' major functions is to control the amount of water in the body. When the kidneys no longer

work well, your body will hold that fluid and you may develop high blood pressure, edema (puffiness), and congestive heart failure from excess fluid in the lungs.

5. Calories are needed to maintain an adequate body weight. The three types of foods which supply calories are carbohydrates (breads, cereals), protein (meat, fish) and fat. The main sources of calories will be fats and carbohydrates. You can encourage your sweet tooth and be generous with fats as seasonings.

   The diabetic renal patient will receive guidance from the dietitian regarding how to count the calories.

   If your daily amount of calories is not eaten, your body will begin to break down your present muscle tissue in order to make up for an inadequate supply, and you will lose weight.

   Your diet prescription will provide you with enough calories to meet the energy needs of your body. Most people need at least 35 calories per kilogram (2.2 pounds) to maintain their weight at their present level.

6. Calcium (Ca) and Phosphorus (P) are two minerals obtained mainly from dairy products and meat in your diet. Both are necessary and important to form strong, healthy bones.

   Both calcium and phosphorus are found in your bloodstream where there is an inverse or "see-saw" relationship; that is, when one goes up, the other goes down.

   When your kidneys do not work properly, the phosphorus builds up in your blood because it cannot be filtered out. This high level of phosphorus then causes a decrease in the level of calcium in the blood. When the calcium level

drops, this causes your parathyroid glands to make more parathyroid hormone.

The increase in the circulating parathyroid hormone causes calcium to be released from the bones. This, of course, increases the level of calcium in the blood but causes the bones to become brittle from a lack of calcium there. The result of this see-sawing back and forth can be easy fractures and broken bones for the dialysis patient.

In order to control the phosphorus levels, you will be taking medication called phosphate binders. Commonly prescribed phosphate binders are Amphojel®, Basaljel®, or Alucaps®.

It is also possible that calcium and Vitamin D may be prescribed for you in an effort to treat or prevent the bone disease described above.

Special Dietary Considerations

All of the above information is general and the dietitian at your dialysis unit will adjust it to suit your needs.

There is other specific information needed for certain patients. Your dietitian can assist you to modify the diet instructions as necessary.

1. For peritoneal dialysis patients, there is an increased need for more protein. You will be instructed on maintaining a higher level of protein and, if necessary, taking protein supplements.

2. For CAPD patients there is less of a need for sodium, potassium, or fluid restriction, but a need to increase protein.

3. For <u>diabetic</u> patients, there may be a need to adjust the carbohydrate intake since there is some glucose in the dialysate.

Your dietitian may give you lists of sodium and potassium contents of foods. Also, you should ask your dietitian for information on eating out in restaurants.

Finally, your dietitian may provide you with a "disaster diet." This is a diet that is very strict and would be used a short time during natural or man-made disasters (floods, power failures, blizzards, earthquakes).

<u>Consequences of Not Following the Renal Diet</u>

Generally, your well-being and your success on the dialysis program will depend on what you choose to eat. The goal of a renal diet is to help you live comfortably, but it really depends on your choices of food.

You can become extremely ill if you choose to ignore the diet prescription that has been worked out for you.

1. If, for example, you choose to eat foods which are high in sodium, you are likely to increase your blood pressure and increase the amount of fluid your body will retain or keep. This in turn may cause complications in your heart or your lungs. You may get cramps on dialysis trying to remove this extra fluid.

2. If you choose to eat foods or fluids which are high in potassium, you are likely to have difficulties with your

heart beat. Potassium is needed for normal muscle and nerve activity, but too much potassium can cause your heart muscle to be too weak and stop beating.

A low potassium level can also be dangerous. If you have too little potassium your heart can beat irregularly and this too can cause severe problems.

Your potassium blood level will be checked regularly and you will be informed if you need to make adjustments in your food intake.

One caution: DO NOT USE ANY SALT SUBSTITUTE. They usually contain potassium and should not be used without your doctor's advice. Sometimes low salt foods use potassium instead of sodium to enhance their flavor and that is why they must be avoided. Read the label, look for the word potassium or the symbol "K."

Success on Dialysis

Success on dialysis depends on several factors, one of which is following a renal diet. Success also depends on the dialysis process itself, complications which may affect you, and the underlying disease. The dietitian will educate you in understanding your renal diet.

Additional Material

The dietitian from your dialysis unit may want to insert some sample menus or sample recipes here as well as add a list of foods important for you to avoid.

There are several fine publications listed in the References. Your dietitian may already have them available in the office. Ask if you may borrow them.

CHECK YOURSELF

Directions: Complete the following phrases. If you do not choose the correct answers, go back and read the material again.

1. My diet prescription is:

   __________ Gm. Protein
   __________ mg. or mEq. Sodium
   __________ mg. or mEq. Potassium
   __________ oz. or cc. Fluid
   __________ Calories
   __________ Other

2. Briefly describe the following elements:

   a. Protein is ______________________________
   ____

   b. Sodium is ______________________________
   ____

   c. Potassium is ______________________________
   ____

   d. Fluid is ______________________________
   ____

   e. Calories are ______________________________
   ____

   f. Calcium and Phosphorus are ________________
   ____
   ____

ANSWERS

1. Your own prescription.

2. Protein is needed for growth and repair of tissues; is the basic building material for cells; has two major categories--high biologic value and low biologic value proteins.

   Sodium is present in most foods. It controls the fluid balance in your body and affects your blood pressure.

   Potassium is a mineral needed by nerve and muscles in your body.

   Fluid is water and anything that is liquid at room temperature.

   Calories are needed to maintain body weight. They come from carbohydrates, protein and fat.

   Calcium and Phosphorus are two minerals obtained from dairy products and meat. They are both necessary to form strong, healthy bones.

UNIT 4 -- MEDICATIONS AND DIALYSIS

Introduction

Diet, medications, and dialysis are directly related to each other. As a self-dialysis patient, you must have a clear understanding of how your diet and medications interact with your dialysis treatments. It is important for you to follow your diet and medication prescriptions since they will affect your "Dialysis Treatment Plan."

The following is an overview of the medicines that are associated with patients on dialysis. These must be fitted to you, individually, by the doctor responsible for your dialysis.

Your Medicines*

Because dialysis only replaces some of the many functions of healthy kidneys, a number of drugs are needed to maintain the dialysis patient's health. Also, other medical conditions which may be unrelated to the kidneys may still require drug treatment. The medicines that have been prescribed by your doctor are each for a special purpose.

---

*In giving examples of medicine it is impossible to mention every medicine in any group. Some of the more common medicines are mentioned by name as examples only. A mixture of brand and generic names are used in this manual in an attempt to use the name with the widest recognition.

Because many drugs, which are usually well tolerated in patients without kidney disease, have more undesirable side effects in kidney failure, you should not take any medicine, prescription or over-the-counter, without checking with the doctor who supervises your dialysis treatment.

The following pages list some of the medicines commonly prescribed. Your dialysis staff will point out which ones have been ordered for you.

The different groups of medicines, in alphabetical order, are:

- Analgesics
- Androgens
- Antacids
- Anticoagulants
- Antihypertensives
- Antipruritics
- Calcium supplements
- Cardiac drugs
- Ion exchange resins
- Iron preparations
- Laxatives
- Phosphate binding agents
- Sedatives & Tranquilizers
- Vitamins

1. Analgesics are for pain. Common analgesics are aspirin, Tylenol® and Darvon®. Apart from relieving pain, these common drugs have other (side) effects which may be useful or harmful in a particular patient. Ask your doctor which of the drugs you may take if needed.

2. Androgens are hormones used in dialysis patients to stimulate the body's production of red blood cells. They may be given by mouth or by intramuscular injection. Examples are Halotestin® and Decadurabolin®.

3. <u>Antacids</u> relieve indigestion. They also bind phosphate in food to a variable extent (see phosphate binders). An example is Amphojel®. Your doctor will advise you about the antacids which contain magnesium. Magnesium can build up to dangerous levels in patients with kidney failure.

4. <u>Anticoagulants</u> help to prevent blood clotting. Examples are heparin, Coumadin® and aspirin. While you are on dialysis, you will be injecting heparin into the dialyzer. If you have an external shunt, you may have Coumadin® prescribed to you.

5. <u>Antihypertensives</u> are drugs for controlling high blood pressure. Examples include Aldomet®, Apresoline®, Catapres®, Inderal®, Minipress®, and minoxidil or Lonitan®. Since many factors influence blood pressure, including the amount of fluid in the body, the dialysis treatment itself may lower blood pressure and the need for blood pressure medications. Your physician will review and change your blood pressure medications from time to time.

6. <u>Antipruritics</u> are given for itching. There are creams and lotions which are particularly helpful for topical use on dry skin. Examples of drugs taken by mouth are Benadryl®, Periactin® and Temaril®. These drugs may cause drowsiness and generally should not be taken before driving.

7. <u>Calcium supplements</u> are often needed as the diets prescribed for dialysis patients are low in calcium. Calcium carbonate, calcium lactate, calcium gluconate, Os-Cal®, Neo-Calglucon®, may be prescribed.

8. <u>Cardiac drugs</u> are prescribed to improve the function of the heart. Digoxin® and Digitoxin® are commonly prescribed to slow and strengthen your heart beat.

Inderal® is prescribed for high blood pressure and to reduce the heart's work. It also slows the pulse rate.

Nitroglycerine tablets and ointment, Isordil® and Nitrobid® are used to relieve angina, the pain felt when the blood supply to the heart is inadequate.

Pronestyl® and quinidine are given to prevent irregular heart beats.

9. Ion Exchange Resins remove potassium from the body by exchanging with sodium. Example -- Kayexalate®

10. Iron preparations may be given, depending on the level of iron in your blood. Iron is needed to help produce red blood cells. Iron may be given by injection, by mouth, or by slow intravenous infusion.

    Ferrous gluconate, ferrous sulfate and ferrous fumarate are commonly prescribed.

11. Laxatives -- Stool softeners will help prevent constipation. Colace,® Surfak,® and Metamucil® are commonly used. If a more powerful laxative is needed to treat constipation, check with your doctor. Many non-prescription laxatives contain magnesium and may need to be avoided by dialysis patients (see antacids).

12. Phosphate-binding agents are needed to keep the calcium and phosphorus in balance in your body and prevent softening of the bones. These medicines bind the phosphorus in food, preventing its absorption in the gut, and allow the phosphorus to be excreted. For this reason they are best taken with meals. Amphojel® and Basaljel® are commonly prescribed.

13. Sedatives and Tranquilizers (e.g., Valium,® Dalmane,® Seconal,® Librium®) are widely used to treat nervousness and sleeplessness in the general population. They may

also be needed occasionally by dialysis patients. However, many tranquilizers and sedatives are less safe in dialysis patients and should only be taken with the approval of your doctor.

14. Vitamin supplements are needed to improve the nutrition of dialysis patients, as dialysis removes certain vitamins from the body. Several multivitamin preparations are used. Some contain iron.

Important Medications

As you learn the medicines or drugs prescribed for you, make a 5" x 7" card for yourself for each medicine. It is important that the actions these drugs have with each other, and the actions they have on you as part of your treatment be understood. Some of the actions will be different for a dialysis patient than for a person not on dialysis. Be sure you take all medications exactly as prescribed.

MEDICATION CARD

NAME OF DRUG: ______________________ DATE: __________

DESCRIPTION: ______________________ DOSAGE: ________

DIRECTIONS FOR TAKING: ______________________

____

DIRECTIONS FOR TAKING ON DIALYSIS DAYS: ______________

____

PURPOSE OR ACTION OF DRUG: ______________________

____

____

NOTIFY DOCTOR OR NURSE IF THE FOLLOWING SIDE EFFECTS OCCUR:

____

____

____

Figure 5

NOTE: Your dialysis staff may want to reduce the size of this down to a wallet size card.

UNIT 5 -- BASIC SELF-CARE MEASUREMENTS AND PROCEDURES

Basic Information

You will start self-care dialysis training by learning some basic information about how to take your own vital signs and weight. You will also learn what your blood values are before and after dialysis.

Also included in this section is information and sample procedures on Blood Pressure (p. 76), Clotting Times (p. 82), as well as two sample procedures on Handwashing (p. 84 and 85).

Vital Signs

Before you start each dialysis, you will take and record your vital signs. Vital signs include the following:

- T = Temperature -- Measures body heat
- P = Pulse -- Measures heart beat
- R = Respiration -- Measures your breathing
- BP = Blood Pressure -- Measures the pressure in your heart and blood vessels.

It is important that the above vital signs be measured accurately before you start and after you complete your dialysis. You will also need to check your vital signs during the actual dialysis treatment and record them on your dialysis flow sheet.

Basic Instructions for Taking Temperature

Temperature. The usual way to take a temperature is to place a glass thermometer under your tongue for three minutes. This is called oral temperature, meaning in the mouth. You should wait ten minutes before taking an oral temperature if you have had a cigarette, a drink, or just eaten. The normal oral temperature is 98.6°F (or 37°C) but there are individual variations, so you should know what is normal for you. It is not unusual for your temperature to be lower than it was before you started on a dialysis program because of the effects of the renal disease itself.

You should take your temperature any time when you feel very warm, or if you feel chilled, whether you are on dialysis or not. Anytime you have a fever over 100°, you should notify the dialysis staff.

NORMAL TEMPERATURE: 98.6°F

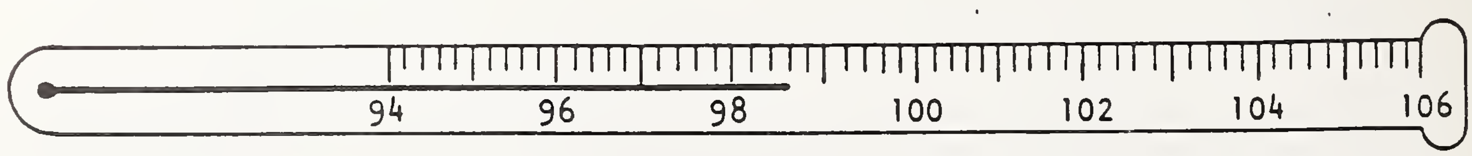


Figure 6

<u>Pulse</u>. The pulse is a direct measurement of your heart beat. The most common way to take a pulse is to place two finger tips on the wrist over the radial artery (see drawing). As you hold your fingers over the pulse, count the beats for a full minute, using a watch or clock with a second hand.

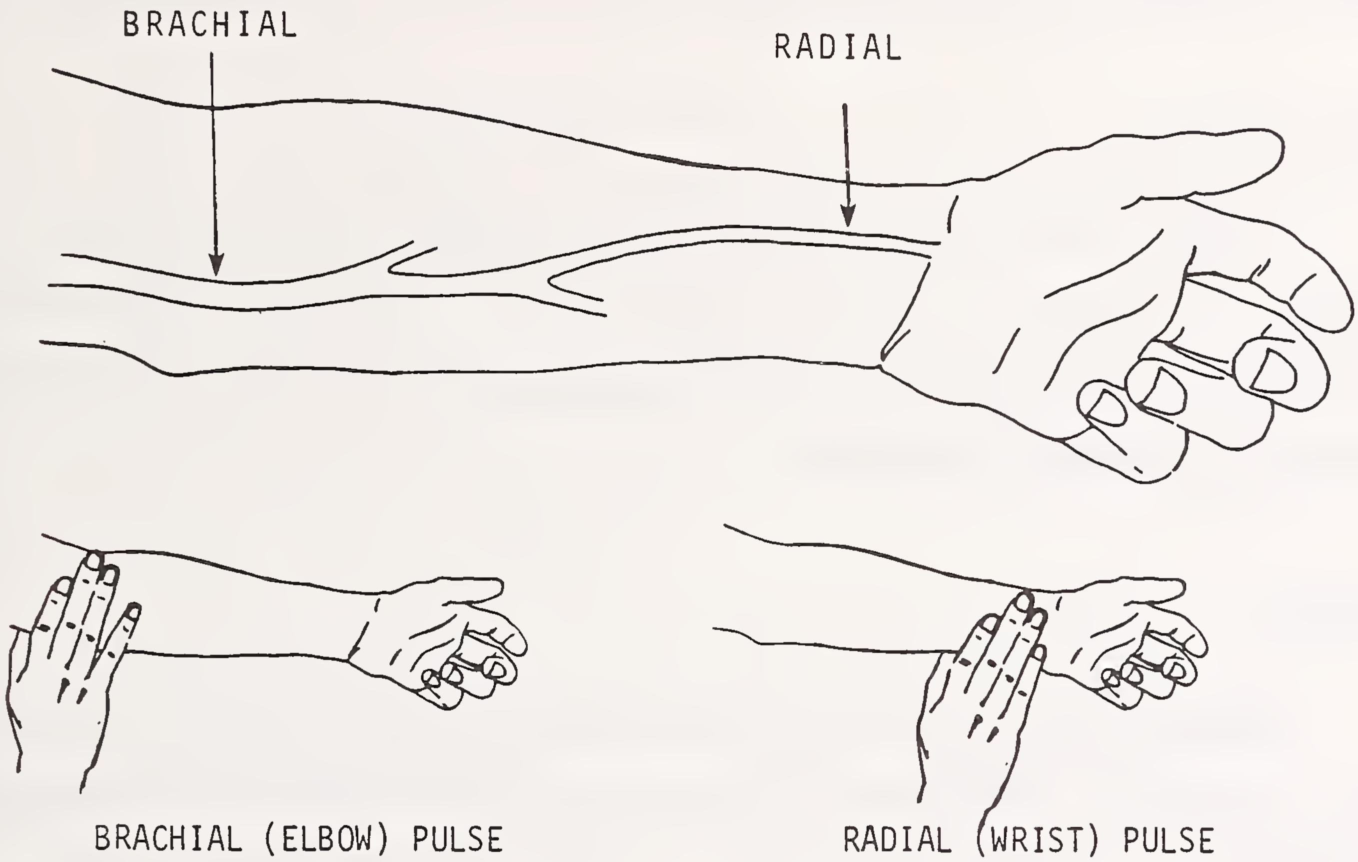


Figure 7

A pulse may also be taken at the brachial artery (in the elbow), at the carotid artery (below your jaw) on your neck, or over your heart itself. The pulse over the heart is called an apical pulse and can be heard using a stethescope. Whenever you have trouble feeling the pulse at the wrist, elbow, or neck, or if it feels irregular, you should check the apical pulse.

If you have a vascular access device in your arm for hemodialysis, the pulse should be taken in the opposite arm.

The normal pulse is between 60-90 beats per minute. It should be strong and regular. If it is weak, irregular, below 60 or over 120, notify the dialysis staff.

Respirations

To take respiration you or your dialysis assistant count the number of breaths you take in one minute. You should also make note of whether they are deep or shallow and whether they sound unusual (such as congested or "wet").

Weight

Weights are usually monitored before (pre) and after (post) each dialysis. These pre- and post-dialysis weights are extremely important.

Your ideal dry weight goal will be measured against your pre-dialysis weight and you will determine how much weight you must remove (if over dry weight) during dialysis. Your ideal body weight will be determined by you and your renal doctor. It is the weight where you will feel your best and your blood pressure is under control. This ideal dry weight will be written on your dialysis order sheet as part of your dialysis treatment plan.

Checking your blood pressure <u>and</u> weight together will help you determine what your action should be. If your blood pressure is <u>unusually</u> low before starting dialysis, you should consult with the dialysis staff before starting.

<u>Basic Instructions</u> for taking your weight accurately at home include:

1. Use the same scale each time.
2. Wear approximately the same amount of clothing each time.
3. Weigh at the same time each day.

Observe the fit of your clothing and your jewelry. If they are tight fitting before dialysis they should become loose after dialysis when the excess fluid is removed.

You can check the fluid in your body also by pressing your finger hard directly over a prominent bone for ten seconds. If you have excess fluid in your body you will notice a dent or "pit" when you remove your finger. This dent indicates "pitting" edema. It is usually noticed in your feet first since the feet are always in a down position. You should notify your dialysis staff if you note pitting edema in your ankles.

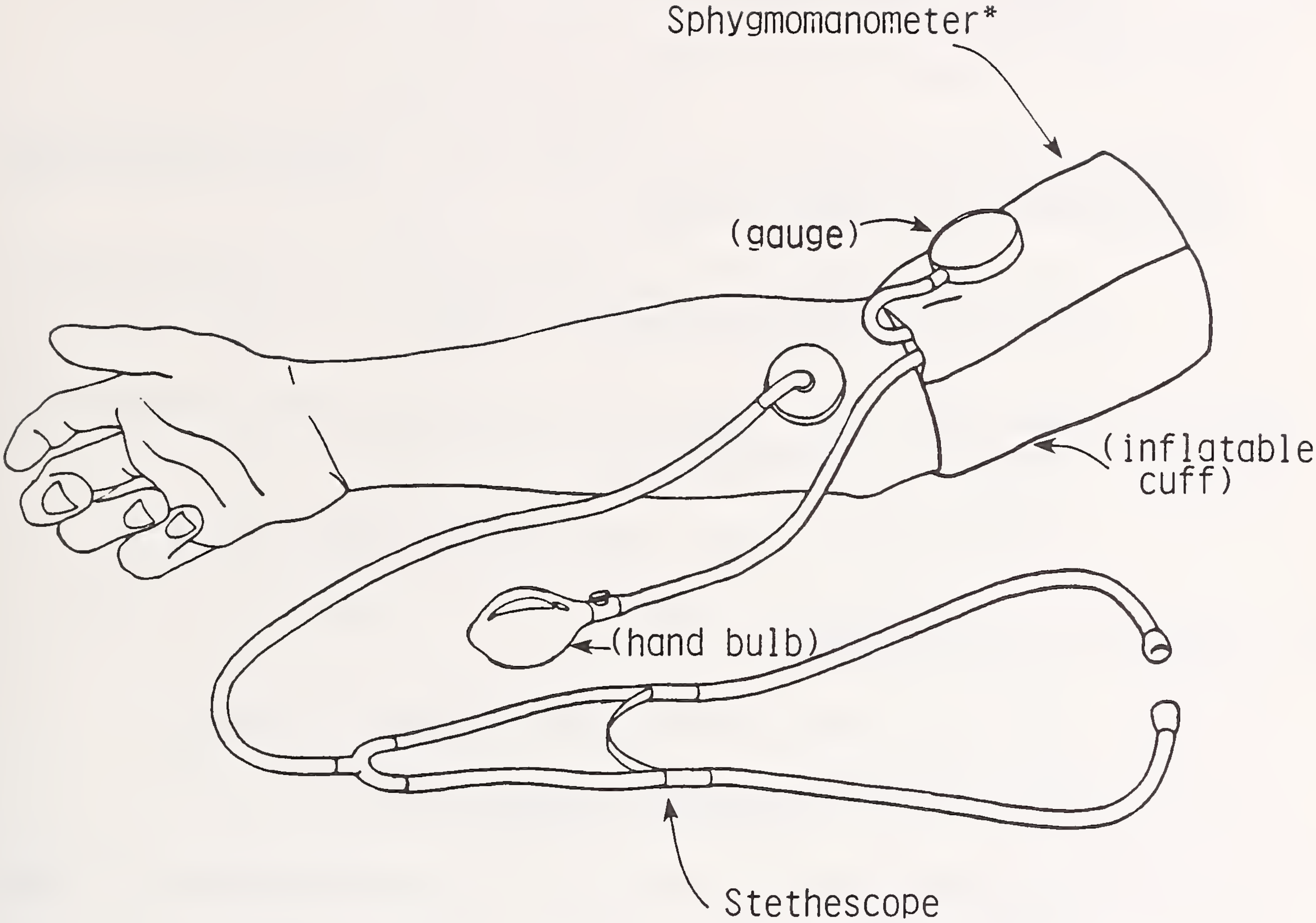
Measuring Blood Pressure

Your blood pressure is a measurement of your heart during two important periods of its activities--the "working" and the "resting" phases. The first is called systolic pressure while the other is known as diastolic pressure.

The measurement is done by the use of a sphygmomanometer which consists of three parts as shown in Figure 8. A stethos-scope is used to hear the sounds from the heart. Air is pumped into the cuff until all sounds through the stethescope disappear. Then the air is slowly released until sounds are heard again. The first sound is a measure of the systolic pressure. These sounds continue until the last one is heard which represents the diastolic pressure.

The numbers are read off the gauge attached to the blood pressure cuff (see drawing). The numbers are expressed as a fraction with one number over the other, such as 120/80, with the top number being the systolic, and the bottom, the diastolic pressure.

While you are on dialysis, your blood pressure reading may reflect a drop because of the amount of fluid being removed from your body by dialysis. Blood pressure should be monitored both during dialysis and between dialyses according to the procedure of your unit.



*The sphygmomanometer has three parts: the inflatable cuff,
the gauge, and
the hand bulb

Figure 8

BLOOD PRESSURE PROCEDURE

Supplies: Blood Pressure cuff (sphygmomanometer)
Stethoscope

1. Place the blood pressure cuff on your arm. DO NOT USE THE ARM WITH A SHUNT, FISTULA, OR GRAFT.

   - Wrap the blood pressure cuff securely around your arm above the brachial (elbow) artery.
   - Keep the lower edge of the blood pressure cuff one inch above the elbow bend.
   - Place pressure gauge where you can see it clearly.

2. Place the stethoscope.

   - Put ear pieces in your ears, slightly forward.
   - Feel for your brachial (elbow) pulse.
   - Place the round, metal disc of the stethoscope over the elbow pulse.

3. Listen for the blood pressure.

   - Squeeze the hand bulb to pump air into the blood pressure cuff until the pressure gauge is 20 points above the top number you heard last time you took your blood pressure.
   - Gently release the thumb screw on the bulb to let the air out of the cuff and let the pressure drop at a slow, steady rate (about four points per second).

- As you let air out of the blood pressure cuff:

  (1) Remember the number on the gauge for the first sound you hear.

  (2) Remember the number on the gauge for the last sound you hear.

- Let all the air out of the blood pressure cuff.

- If you need to check your pressure again to be sure you hear it correctly, wait 15 seconds before inflating the cuff with air again.

4. Record your blood pressure on your flow-sheet.

BLOOD VALUES

Chemistries

One of the purposes of dialysis is to remove waste products from your blood stream. As a self-dialysis patient, you will be aware of your chemistries and you will be discussing these with the dialysis staff (nurses, physicians, and dietitians). You will be instructed how to make some adjustments in your plan for dialysis as well as adjust your dietary intake if your chemistries are off.

Hematocrit

Your red blood count is reflected in hematocrit. This is frequently called the "crit." You will learn to determine your own hematocrit and may do so frequently. If it is particularly low, you may need a blood transfusion. Your dialysis unit staff will advise you about this.

The hematocrit is the percentage of red blood cells to the total blood volume in the body. A low hematocrit may indicate either a water weight gain or a need for a blood transfusion.

Hematocrits are done at the beginning of dialysis, at the end of dialysis, or anytime during treatment when there is a blood loss (rupture, clotted drip chamber, etc.).

BLOOD CHEMISTRIES*

	Normal Range	My Usual Pre-dialysis
Potassium (K)		
Sodium (Na)		
Chloride (Cl)		
Magnesium (Mg)		
Blood Urea Nitrogen (BUN)		
Creatinine (Creat)		
Calcium (Ca)		
Phosphorus (P)		
Others: ______ ______ ______ ______ ______ ______		

* Your dialysis unit staff will identify which chemistries you need to list here.

Figure 9

Clotting Times

Introduction

It is necessary to take clotting times of your blood when you are on hemodialysis. Generally, the clotting times are done on the venous line which is the line coming from the dialyzer. There are times, however, when you may take clotting times from the arterial line, if you need to determine how long the blood coming from you takes to clot.

General Information

Clotting tubes must be clean and dry. They should be stored upside down until ready to use. Any foreign material which might get into the tube will make the clotting time inaccurate.

Clotting times are done when any of the following conditions occur:

1. When you need to establish a heparin schedule.
2. If your dialysis time has been increased or decreased.
3. If you have an elevated temperature.
4. If the blood clots in the drip chamber, the dialyzer, or the blood lines.
5. If the fistula or graft will not stop bleeding after a treatment.

6. If there has been an interruption in the treatment where dialysis must be stopped and restarted.

7. If there are clots or thick rings in the drip chamber during or after the treatment.

<u>Average Times</u>

Clotting times should be between 25 and 35 minutes during the dialysis treatment and between 18 and 20 minutes at the end of the dialysis treatment.

Factors which influence the time it takes your blood to clot are:

1. Your individual requirements
2. Weather changes
3. Physical conditions
4. Stress situations

SAMPLE

Clotting Time Procedure
(During Hemodialysis)

Purpose: To determine how many minutes it takes your blood to clot:

a. Blood taken from venous blood line will be blood coming from the dialyzer;

b. Blood taken from arterial blood line will be blood coming from you.

Gather Equipment:

3 cc. syringe

22 gauge needle

alcohol wipes

glass clotting tube

clotting tube holder

ESSENTIAL STEPS	EXPLANATION
1. Prep the blood line sleeve with an alcohol wipe.	1. Generally, clotting times are done on blood leaving the dialyzer (venous). If you suspect that you have a bleeding problem, you may wish to check the blood coming from you (arterial).
2. Carefully insert needle into sleeve and slowly draw out 1 cc. of blood.	2. This must be done slowly to avoid damaging the red blood cells. If these cells are damaged, the clotting time will not be accurate.

Clotting Time Procedure (Continued)

ESSENTIAL STEPS	EXPLANATION
3. Place alcohol wipe over puncture site, then remove syringe and needle from the sleeve. Carefully discard the needle off the used syringe.	3. Prevents blood spillage.
4. Place blood from syringe into clotting tube by letting the blood flow down the side of the tube.	4. This prevents air bubbles from mixing with the blood which also alters the clotting time.
5. Place the clotting tube in the rack. The tube must sit upright and may not be moved until it is time to be tilted.	5. Untimed movements may effect the results.
6. Record on the dialysis record the exact time the specimen was drawn; and the amount of heparin left in the syringe. (Syringe used for continuous infusion of heparin.)	6. Serves as a baseline to gauge heparin doses.
7. Tilt the tube once every 30 seconds until a clot is formed.	7. Tilting the tube too frequently or not tilting it often enough or too vigorously will alter the clotting time.
8. Record the length of time it takes the blood to clot (form a firm jelly).	

SAMPLE

HANDWASHING WITH BAR SOAP	
<u>Gather Supplies</u> Sink with warm running water Nail cleaner Bar of soap Paper towels	

ESSENTIAL STEPS	EXPLANATION
1. Turn on a slow stream of warm water.	1. Water running rapidly will splash.
2. Wet hands from wrists down.	
3. Clean under nails with nail cleaner.	3. Remove dirt and germs from under nails.
4. Begin wash at wrist. Create a lather with bar soap.	4. Lather helps to remove dirt and germs.
5. Wash palms and back of hands of both hands.	
6. Wash thumb and fingers on all four sides on <u>one hand</u>.	
7. Wash thumb and fingers on all four sides on <u>other hand</u>.	
8. Put soap down.	8. Do not let hands touch any part of sink or soap dish.
9. Rinse both hands from wrist down to fingertips.	9. Let water run downward, off fingertips.
10. Dry hands on paper towel, drying only the wet, washed area.	
11. Turn off faucets with paper towel.	11. To prevent re-contamination of hands by dirty faucets.
12. Do not retouch sink or faucet with clean hands.	12. Hands will pick up dirt and germs again.

SAMPLE

HANDWASHING WITH SCRUB BRUSH (BETADINE®)	
<u>Gather Supplies</u> Sink with warm running water Nail cleaner Disposable Betadine® scrub brush Paper towels	

ESSENTIAL STEPS	EXPLANATION
1. Turn on a slow stream of warm water.	1. Water running rapidly will splash.
2. Open Betadine® scrub brush.	
3. Wet hands from wrists down.	
4. Clean under nails with nail cleaner	4. Remove germs and dirt from under nails.
5. Begin scrub or wash at wrist. Create a lather with scrub brush.	5. Lather helps to remove germs and dirt.
6. Scrub palms and back of hands, one at a time.	
7. Scrub thumb and fingers on all four sides on <u>one hand</u>.	
8. Scrub nails with scrub brush on <u>one hand</u>.	
9. Repeat numbers 7. and 8. on <u>other hand</u>.	
10. Put brush down.	10. Do not let hands touch any part of the sink.
11. Rinse both hands from wrist down to fingertips.	11. Let water run downward, off fingertips.
12. Dry hands on paper towel drying only the wet, washed area.	

ESSENTIAL STEPS	EXPLANATION
13. Turn off faucets with paper towel.	13. To prevent re-contamination of hands by dirty faucets.
14. Pick up brush with paper towel and discard.	
15. Do not retouch sink or faucet with clean hands.	15. Hands will pick up dirt and germs again.

UNIT 6 -- LONG-TERM PROGRAMS AND PATIENT CARE PLANS

Introduction

You, the self-dialysis patient, the dialysis treatment team and possibly some members of your family will discuss your long-term program. In a deliberate and systematic manner, you will talk about your future goals regarding dialysis and transplantation. The options will be outlined, and you and your family will be able to participate in the process right from the beginning.

Long-term programs change over time. What you decide when you start dialysis may change in six months. You may request a patient care conference to review your plan at any time. A sample Long-Term Program Form is included in this Unit.

Patient care plans contain the details of how progress toward short-term goals will be accomplished. Target dates are set and step-by-step directions on the responsibilities of the patient, the dialysis team and family members will be outlined. Patient care plans are very personal, based on each person's needs and desires. These plans are written in a positive manner and focus on your strengths. A sample Patient Care Plan Form is included in this Unit.

The reasons for doing patient care planning with you are as follows:

- You are involved from the <u>beginning</u> in helping to decide what your dialysis treatment plan will be.
- You will concentrate on your <u>strengths</u>, starting by deciding what you're good at, or what you do best.
- You will break down each large task into <u>small steps</u>.
- You will work with your training nurse to decide <u>who</u> will do <u>what</u>, and <u>when</u>.
- You will stop periodically, and <u>evaluate</u> your progress with the dialysis treatment team.

LONG TERM PROGRAM SAMPLE

PATIENT: ________________________ DATE: ____________

I. TRANSPLANTATION

☐ Desired by Pt. ☐ Declined by Pt.
Reason: ____________________

☐ Desired by M.D. ☐ Declined by M.D.
Reason: ____________________

Referred for Evaluation ____________ (Date)

Placed on Cadaver List:
____________ (Date) ____________ (Where)

Ready for LRD Tsp ____________ (Date)

II. SELF-CARE DIALYSIS

HEMODIALYSIS ☐ Home ☐ In Center

☐ Desired by Pt. ☐ Declined by Pt.
Reason: ____________________

☐ Desired by M.D. ☐ Declined by M.D.
Reason: ____________________

PERITONEAL DIALYSIS ☐ Home ☐ In Center

☐ Desired by Pt. ☐ Declined by Pt.
Reason: ____________________

☐ Desired by M.D. ☐ Declined by M.D.
Reason: ____________________

III. STAFF-ASSISTED DIALYSIS (IN-CENTER)

HEMODIALYSIS

☐ Desired by Pt. ☐ Declined by Pt.
Reason: ____________________

☐ Desired by M.D. ☐ Declined by M.D.
Reason: ____________________

PERITONEAL DIALYSIS

☐ Desired by Pt. ☐ Declined by Pt.
Reason: ____________________

☐ Desired by M.D. ☐ Declined by M.D.
Reason: ____________________

SIGNATURES:

____________________ Patient

____________________ M.D.

____________________ R.N.

____________________ M.D. (Transplant Surgeon)

____________________ R.D.

____________________ S.W.

Figure 10

PATIENT CARE PLAN SAMPLE *

PATIENT NAME: ______________________	DATE: __________
1. FLUID MANAGEMENT PLAN: (S) ____ (O) ____ (A) ____ (P) ____	5. CALCIUM/PHOSPHORUS MANAGEMENT PLAN (S) ____ (O) ____ (A) ____ (P) ____
2. AZOTEMIA & ELECTROLYTE MANAGEMENT PLAN (S) ____ (O) ____ (A) ____ (P) ____	6. VASCULAR ACCESS MANAGEMENT PLAN (S) ____ (O) ____ (A) ____ (P) ____
3. HEMATOCRIT MANAGEMENT PLAN: (S) ____ (O) ____ (A) ____ (P) ____	7. PROGRESSIVE SELF MANAGEMENT PLAN: (S) ____ (O) ____ (A) ____ (P) ____
4. BLOOD PRESSURE MANAGEMENT PLAN: (S) ____ (O) ____ (A) ____ (P) ____	8. (Other) MANAGEMENT PLAN: (S) ____ (O) ____ (A) ____ (P) ____

Figure 11

PATIENT CARE PLAN SAMPLE

PATIENT NAME: ______________________	DATE: ______________
9. <u>PSYCHOSOCIAL STATUS</u>: ASSESSMENT ______________________ ______________________ ______________________ PLAN ______________________ ______________________ ______________________ ☐ See individualized goal plan. Signature ______________________ S.W.	10. <u>NUTRITIONAL STATUS</u>: ASSESSMENT ______________________ ______________________ ______________________ PLAN ______________________ ______________________ ______________________ ☐ See individualized goal plan. Signature ______________________ R.D.

SIGNATURES:

______________________ Patient

______________________ R.N.

______________________ M.D.

______________________ R.D.

______________________ S.W.

* <u>NOTE</u>: The sample patient care plan shown here is condensed to show all the sections. It may need to be expanded to include necessary detail. Similar patient care plans should be on file in your records at the training unit. Please use glossary for definition of unfamiliar words.

Figure 11 (Continued)

The previous example of a patient care plan illustrates one method of approach to preventing or correcting long-term dialysis complications. It uses the S.O.A.P. system of problem management.

S. <u>Subjective</u> input to the problem area. This information is provided primarily by you. For example, when you tell your treatment team that you are short of breath, they may suspect that you are fluid overloaded or that your hematocrit is low.

O. <u>Objective</u> input to the problem area. This information is provided by measureable data. If you consistently gain too much fluid, your daily weights will reflect this fact. If your hematocrit is low, it may be verified by drawing a blood sample for testing.

A. <u>Assessment</u> of the situation based on subjective and objective input. If you have been gaining large amounts of fluid then your treatment team will probably assess the problem as resulting from your poor fluid control. If your blood test shows a low hematocrit, then your treatment team may assess the problem as resulting from too few red blood cells. Many factors contribute to the problem.

P. <u>Plan</u> of action. Usually in deciding on a plan, you and your treatment team will try the simplest solutions first. If you gain too much fluid you will be expected to follow

your fluid restriction more carefully. If your hematocrit is low, you may be taught to return your blood more efficiently after your treatments. You may be asked to take medications which may improve your hematocrit or perhaps you will be given some blood at regular intervals.

UNIT 7 -- SEX AND INTIMACY

Human sexuality is concerned with the individual as a whole and not only with the sexual act. Your overall relationship with your sexual partner determines your enjoyment of sex. Your love for each other as shown by your daily attitude to each other, your closeness to each other, your kissing and petting, your caressing and touching, your enjoyment at meal time, your sharing of a good joke and the thousands of things you do daily, are really part of sex and sexuality.

Sexual problems which can occur with illness may be aided by honest discussion between partners, flexibility between partners, help from experts, and a little patience.

The sex life of renal dialysis patients, like that of all other human beings, will have ups and downs. If you do find yourself facing problems, you may want to read one of the books which are listed below. If this does not help, we would suggest that you seek advice from someone on your dialysis staff: your social worker, psychologist, doctor, or nurse.

Sexual problems of a long duration may require some professional help. Someone, such as the social worker, nurse, or physician, will be able to advise you about how to contact those individuals who are available for such help.

References

1. Levy, Norman B. Sex and Intimacy for Dialysis and Transplant Patients. Washington, D.C.: Virgil Smirnow Associates, 1978.

2. Oberly, E.T. and Oberly, T.D. Understanding Your New Life With Dialysis. (A Patient Guide to Physical and Psychological Adjustment to Maintenance Dialysis.) Springfield, Ill.: Charles C. Thomas, 1975.

3. Ulery, Barbara. Sex and Dialysis: Steps Toward Renewed Sexual Pleasure for the Dialysis Consumer. Durango, Colorado: Barbara Ulery, 1979.

UNIT 8 -- VACATIONS AND TRAVELING

Vacations can be fun. What you do depends on your time, interest, and money.

If you are interested in taking a long vacation away from your own home or city, you might investigate what options other patients have tried. Some of the options are:

1. Taking your own machine and supplies and setting it up in your vacation spot.
2. Outfitting a camper trailer with your own equipment.
3. Learning to do dialysis on portable, suitcase-like equipment which can be run in your hotel room. (Hemodialysis)
4. Going to an in-center dialysis unit in your vacation city.

Assuming Responsibility for Traveling

You will need to assume most of the responsibility in the area of traveling. The staff at your dialysis unit, perhaps your nurse or social worker, may be able to help you with some of the coordination if necessary. Every unit should have a list of all dialysis facilities in the United States, so you can check this list if you are going to dialyze in-center. This applies to both hemodialysis and peritoneal dialysis patients.

If you are going to dialyze in a dialysis unit in your vacation city, the unit will usually need the following information:

- SSA 2742 -- A form kept in your record to show your Medicare eligibility.
- Medical Summary -- Your current physical status.
- Patient Information -- Shows type of dialyzer (or equipment) for use, medications, lab work, usual pressures, complications, and allergies.
- Hepatitis Status -- Dialysis units that offer dialysis for vacationing patients need to know the most recent status of the blood tests that check for serum hepatitis.

It is most important that you know your own status, as well as the policies of the dialysis units which you will use. Some units do not allow patients with positive hepatitis tests to dialyze in their units. They have the right to refuse to dialyze positive patients if they have a negative unit.

Making Your Travel Plans

If you are taking the responsibility for setting up your own travel plans which include dialysis in a dialysis unit, you have two options:

- Write a letter.
- Use the phone. (Follow up with a letter.)

Either way, be clear, concise, and specific about your plans so that the other unit can help you as quickly as possible. If the

unit you called or wrote to can't help, ask them for suggestions for other units in the area that might be able to fit you in.

Paying for Dialysis on Vacation

If you have Medicare coverage, Part A and B, it will cover the 80 percent of dialysis in a certified center just as it does at home. If you do not have a supplemental insurance policy to pick up the remaining 20 percent of your dialysis costs, you need to check in the dialysis office to see how the 20 percent is being paid. If you are covered either by Medicaid or by a state kidney program, they may continue to pay for you on vacation. If they don't, you may have to pay the remaining cost yourself. Be sure to check on this ahead of time, since some units will want advance notice from your unit to verify the payment procedure.

section two

basic training manual

CHAPTER 3 -- BASICS OF HEMODIALYSIS

UNIT 1 -- PRINCIPLES OF THE HEMODIALYSIS SYSTEM

Parts of the Hemodialysis System

The main parts of the dialysis system are listed below:

1. You -- the patient
2. Your vascular access device -- a shunt, fistula or graft
3. The artificial kidney -- or hemodialyzer
4. The fluid delivery system -- the "machine"
5. Dialysis components such as blood tubing, a blood pump, a heparin pump and an air detector.

You -- The Patient

You are the most important part of the whole hemodialysis system. You are unique, with reactions all your own to the whole process of dialysis.

Remember, as stated in the introduction to this manual, that each person will learn to do self-dialysis at a different rate. Some people may be slower than you and some people may be faster. You are you, and you will learn the procedures at your own pace.

Your Vascular Access Device (Shunt, Fistula, or Graft)

In order to use the artificial kidney, it is necessary to temporarily detour some of your blood through the dialyzer, where the waste products and fluid are removed, and then return it back to your body. The access device is put in your arm or leg during a short surgical procedure. To make this by-pass possible, one of several types will be used:

1. Shunt (external, on the outside)
2. Fistula (internal, on the inside)
3. Other grafts, some made from synthetic materials.

The unit which follows contains a more complete explanation of shunts and fistulas and the care of each. (See Unit 2).

A Shunt

A shunt is a vascular access device that is created by inserting a small plastic tube into an artery and a vein and bringing them outside the skin and connecting the ends with another small piece of plastic called a "connector." When you are going on dialysis, you remove the connector and attach the arterial line to the arterial end of the shunt and attach the venous line to the venous end of the shunt. There are no needles to be inserted.

A typical shunt is shown in Figure 1, below. Figure 2 shows where you can feel the slight vibration called the "thrill" with your fingertips. Figure 2 also shows the use of a stethescope to listen to the "bruit." It will be a soft, swooshing sound. You can also listen at the same place where you feel the "thrill." (See further discussion on page 115.)

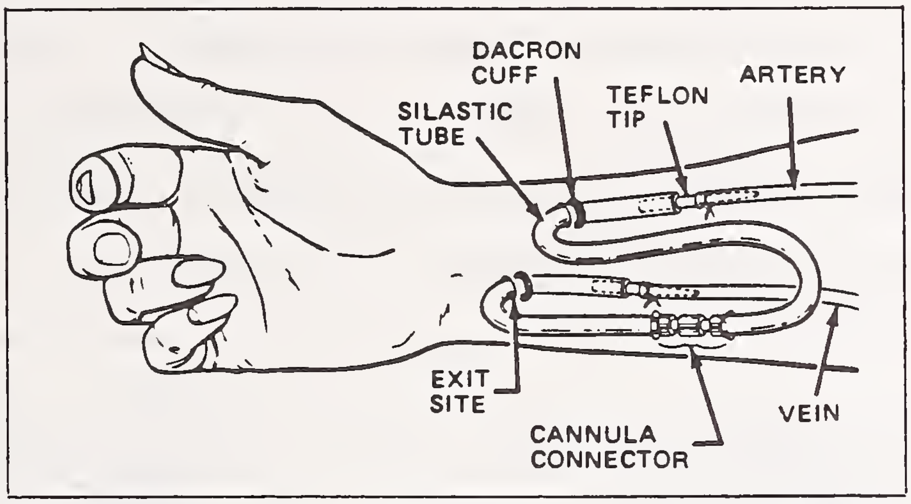


Figure 1

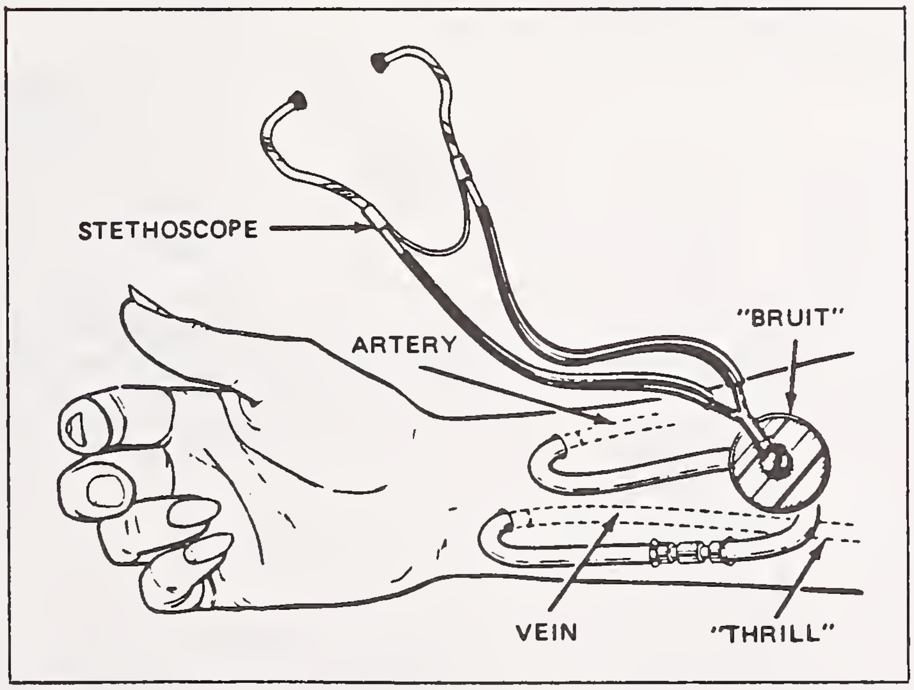


Figure 2

SOURCE: Jackle, Mary and Rasmussen, Claire. Renal Problems: A Critical Care Nursing Focus. Bowie, Maryland: Robert J. Brady, Co., 1980.

A Fistula

A fistula is made by surgically joining an artery and a vein under your skin. This will make blood flow constantly from the artery to the vein.

After surgery you may be given instructions on how to use a tourniquet and rubber ball to exercise the arm. You should do these exercises to enlarge and toughen the vessels. This will prepare them for later when you begin to use these vessels to do the veni-punctures or "needle-sticks" for dialysis. The three figures below show the surgical procedures.

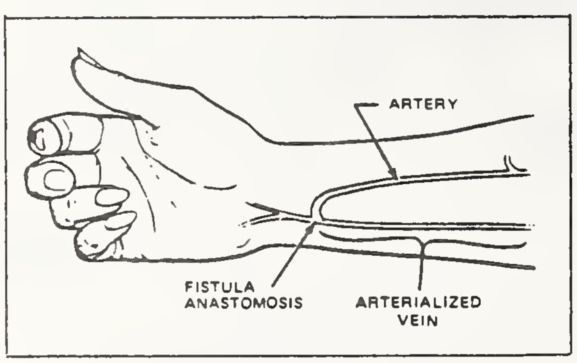


Figure 3

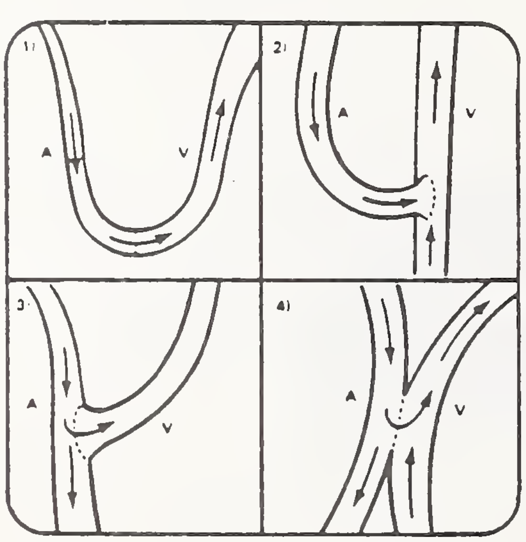


Figure 4

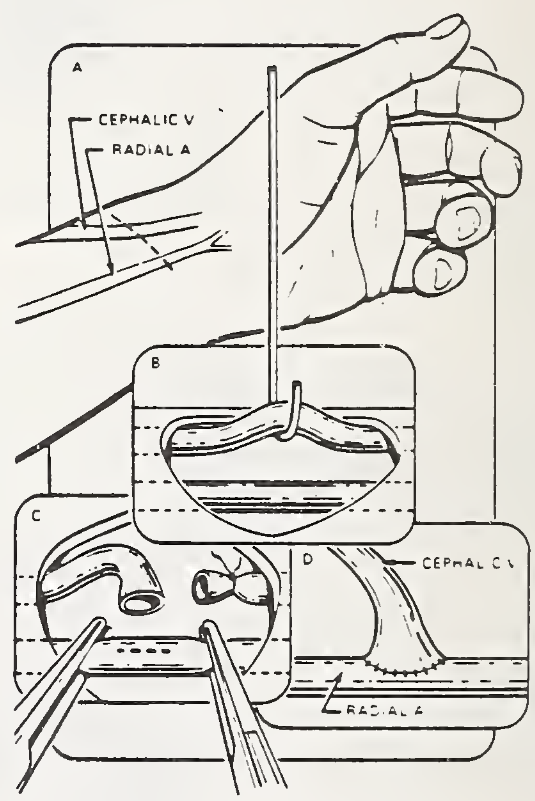


Figure 5

SOURCE: Jackle, Mary and Rasmussen, Claire. Renal Problems: A Critical Care Nursing Focus. Bowie, Maryland: Robert J. Brady, Co., 1980.

A Graft Fistula

A graft fistula is made surgically under the skin, but instead of joining your own vein to your own artery, directly, other materials may be used.

One commonly used graft fistula is a bovine graft. A specially prepared piece of the carotid artery of a cow (bovine) is used to join your artery to your vein. Another one is the PTFE (polytetraflouralethyline) graft. This is a man-made material that is specially woven to heal after puncture, similar to your own vessels. Figure 6 shows one example of a graft fistula.

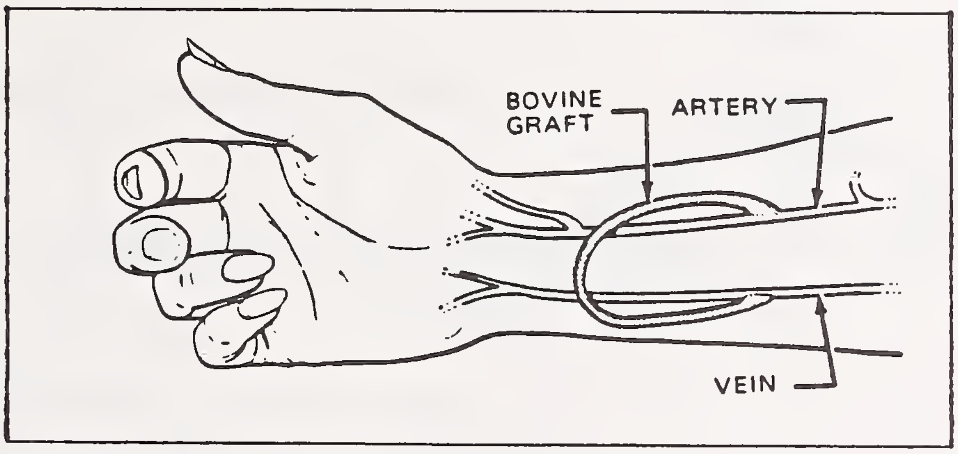


Figure 6

SOURCE: Jackle, Mary and Rasmussen, Claire. Renal Problems: A Critical Care Nursing Focus. Bowie, Maryland: Robert J. Brady, Co., 1980.

The Artificial Kidney or Dialyzer

The artificial kidney or dialyzer is the part of the system where the actual dialysis occurs. The chemicals and excess fluid

are removed here. Two fluids--your blood and the dialysate (a chemical solution)--are separated by a membrane. As they flow past the membrane, the chemicals are forced out by pressure.

The Fluid Delivery System or the "Machine"

The dialysis "machine" prepares and sends the dialysate solution (a chemical solution) through a programmed route so that it passes over the membrane which covers your blood. When the dialysate solution passes over the membrane, it draws the excess chemicals out of your blood, by applying the two principles of diffusion and ultrafiltration.

- Diffusion is the process of removing chemicals and waste products.
- Ultrafiltration means applying pressure to the system to remove even more water.

Fluid delivery systems fall into one of these two categories:

Batch: A solution of dialysis concentrate and water is mixed in a holding tank. This mixed dialysis bath solution is then used for the duration of dialysis. Examples of the batch delivery system are the Travenol® and the Sorb-System® machines.

Proportioning: Dialysis concentrate and water are mixed continuously and monitored by the delivery system. Examples of the proportioning delivery systems are the Cobe-Century®, the B.D. Drake-Willock®, and the Cordis Dialysystem® machines.

BASIC PARTS OF THE HEMODIALYSIS SYSTEM

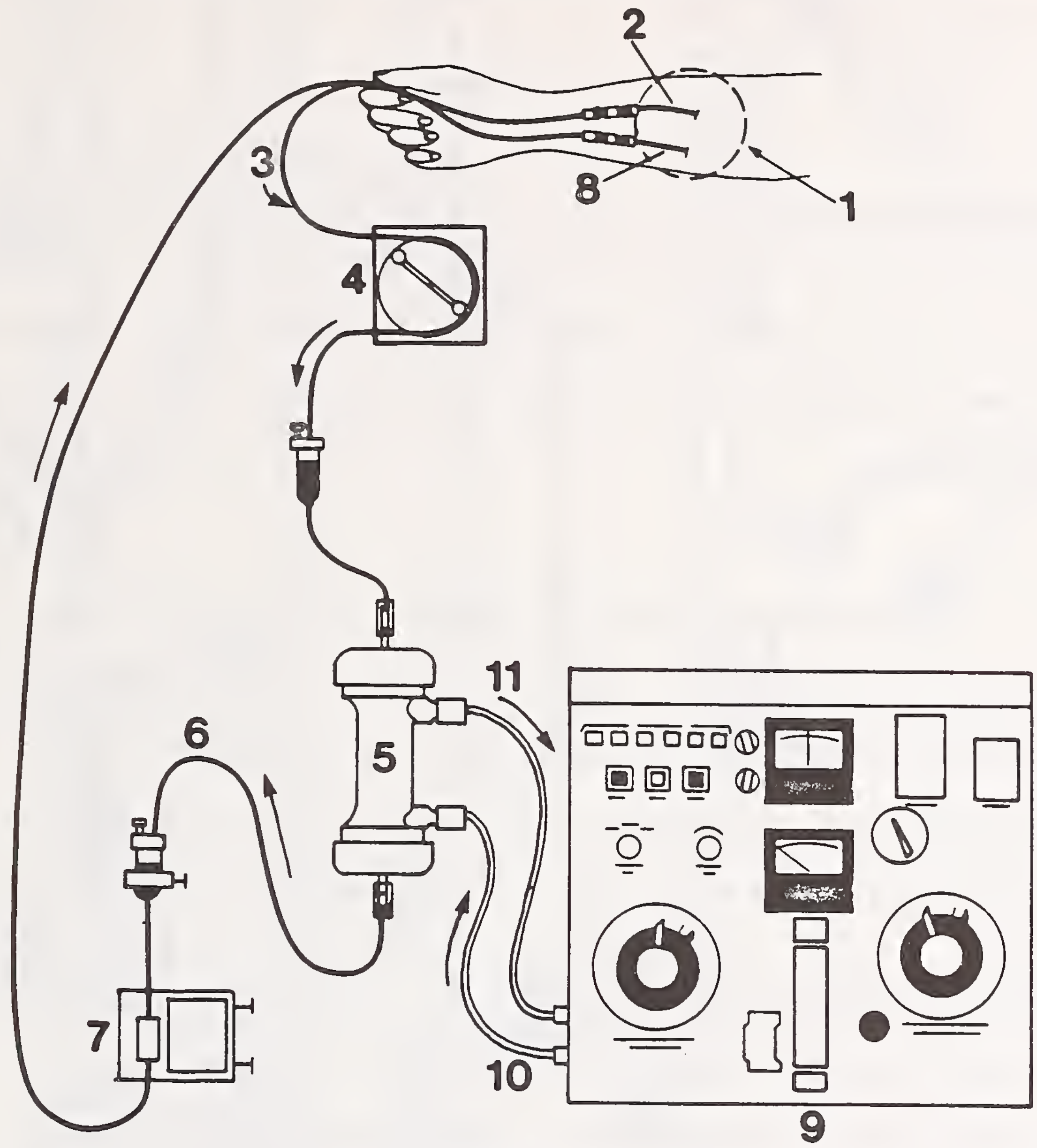
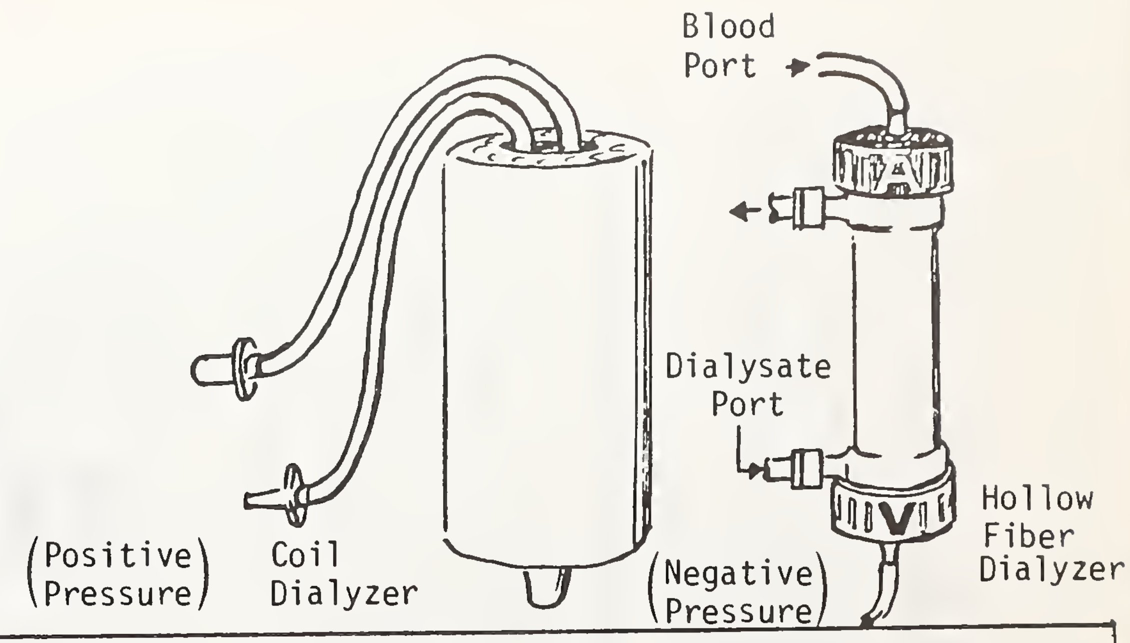


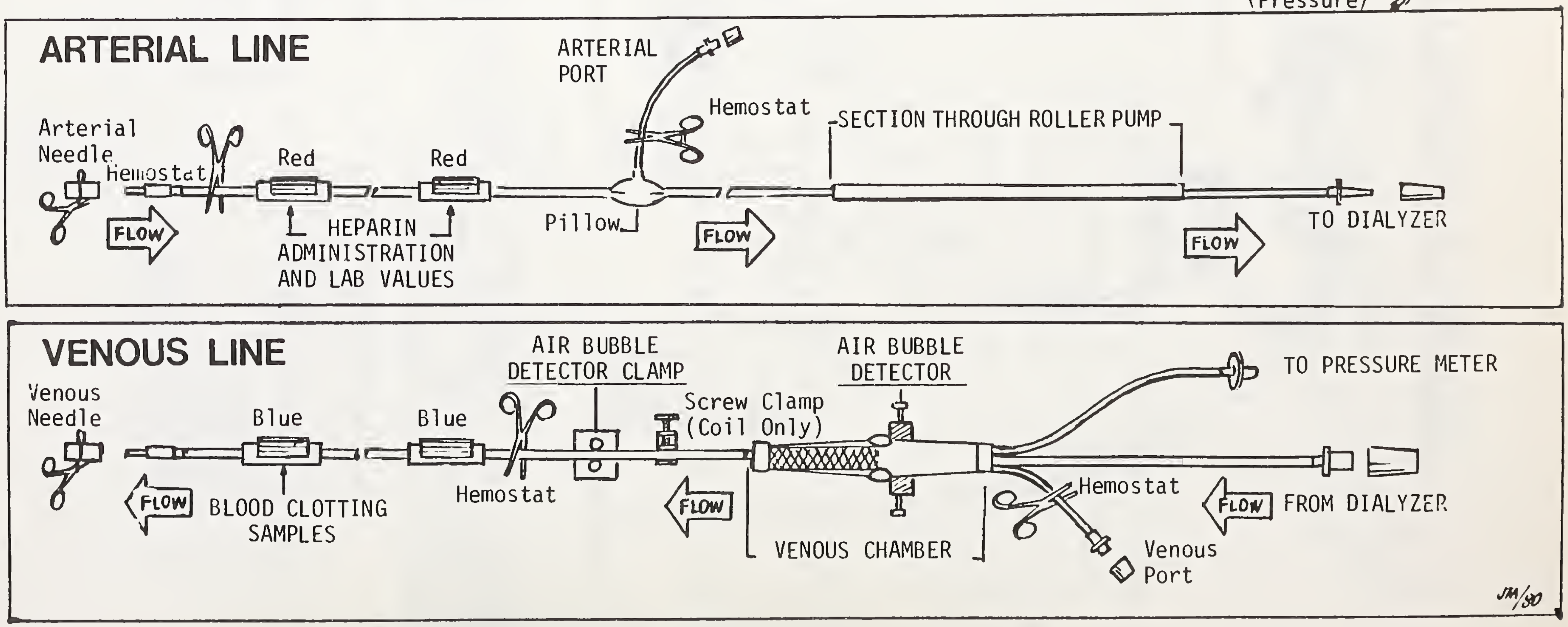
Figure 7

Adapted from: Jacobberger, P. About Your Care: The Home Hemodialysis Training Manual. Minneapolis, MN: Minneapolis Medical Research Foundation, Inc., 1980, p. 15.

1. Vascular access device
2. Arterial side of access
3. Arterial blood tubing
4. Blood pump
5. Dialyzer
6. Venous blood tubing
7. Air detector
8. Venous side of access
9. Fluid delivery system
10. Inflow hose
11. Outflow hose

ARTERIOVENOUS BLOOD TUBING SET





Source: Jim Meyer, Home Hemodialysis Patient, Dayton, Ohio, 1980.

Figure 8

UNIT 2 -- CARE OF YOUR VASCULAR ACCESS DEVICE

A. General Care for Fistulas

Listed below are some general care measures to be performed by you as you care for your own fistula. Your dialysis unit may have additional instructions for you. If so, insert them in the binder at this point.

1. Check for a pulse (bruit or thrill) everyday. Put your fingers over the vein to feel the pulse. If you have a hard time feeling it you may try to hear it with a stethoscope. If you neither hear nor feel it, call your dialysis unit immediately because the vein may be clotted.

   A bruit (broo'-ee) is sound created by the shunting of high pressure arterial blood into a low pressure vein. Rhythmic swooshing, which corresponds to your heart contractions, may be heard by placing the diaphragm of a stethescope at the point in the vein where the joining of arterial and venous flow create turbulence.

   The thrill is the pulsating vibration felt by placing your fingers on the area of your vein where the joining of arterial and venous flow create turbulence.

2. Check for signs of infection every day. If you notice the vein is red, tender, painful, swollen, or draining pus, call the dialysis unit and report this to them.

3. Check for bleeding every day. The heparin which you get during dialysis may linger in your body for 4 to 6 hours and cause some bleeding after dialysis is finished. Apply pressure to the bleeding site until it stops. If this does not cause the bleeding to stop, call the dialysis unit.

Swimming and Bathing

Swimming, bathing and showering are all permissible with a fistula. Daily washing of the fistula is encouraged. You may use ordinary soap, or an anti-bacterial soap like Dial®, Phisohex®, or Betadine®. Don't scrub so hard that you dislodge the clot over the needle stick site.

Other Precautions

1. Do not lie or sleep on the fistula arm.

2. Do not wear tight dressings or clothing over the fistula.

3. Do not apply a tourniquet or take a blood pressure on the arm with a graft fistula, until after it is well healed. (You will receive specific instructions on this point from your dialysis staff.)

4. Do not wear watches, jewelry or tight hospital bands on the fistula arm.

5. Do not carry heavy packages, small children, etc., with your fistula arm.

The reason for the above precautions is to prevent the possibility of decreasing the blood supply to the fistula.

Learning to Stick Your Fistula

As your training in self-dialysis progresses, you will learn how to stick your vascular access. Many patients learn to stick themselves right away, while others may feel more comfortable having their assistant do this. Your training nurse will offer some guidelines to help you with your decision. Points you may consider in making this decision are:

1. Are you right or left handed?

2. Which arm is the access located in? (It may be easier if the access is in the leg.)

3. Do you (or your assistant, if you have one) have any physical impairments which might make sticking difficult, such as reduced vision, loss of function in the hands, etc.?

Your fistula is very important to you. Since only you can "feel" how the needles go in, <u>you</u> are the best judge as to how, when, and where they should be placed.

You may be very nervous about inserting your own needles the first few times, but if you practice you can do it well. As you build up confidence you will find you can do a better job of inserting your own needles than anyone else. It is possible to learn to do this even with your non-dominant hand. Your sense of pride and accomplishment will greatly reward you for pursuing this procedure.

There are, of course, situations that come up when you may not be able to insert your own needles. You are, however, encouraged to try. After sticking your own fistula over a period of time, you get to know its shape--twists, depth, etc. Be gentle, and it will serve you a very long time.

Guidelines for Fistula Sticking

Note: These are guidelines. Your training nurse will help you make the necessary adjustments for your access.

1. Apply tourniquet to the upper arm to get vessels to expand.
2. Feel vein with index and middle finger to determine your venous stick.
3. Wipe the area you plan to stick with Betadine® solution once.
4. Insert xylocaine needle (bevel up) so that the bevel is just under the skin and over the vein. (xylocaine is optional)
5. Draw back on the plunger to be sure you have not entered the fistula. If blood appears, remove tourniquet, remove needle, and apply pressure.
6. If no blood appears, inject xylocaine slowly until a small "mosquito" bite appears.
7. Remove tourniquet.
8. Remove xylocaine needle. Use sterile 4" x 4" to massage the area.
9. Reapply tourniquet to the upper arm.
10. Take the fistula needle with "butterfly" in the thumb and index finger. (You may need assistance to hold the syringe.)
11. Feel the vein with index and middle finger of the opposite hand and then wipe the area you plan to stick with Betadine® solution.
12. Place the fistula needle with the bevel up in the numbed area over the vein. Use the 4th and 5th fingers of the hand you are sticking with for support.

13. Check for the proper angle between the needle and the vein. See the diagram below.

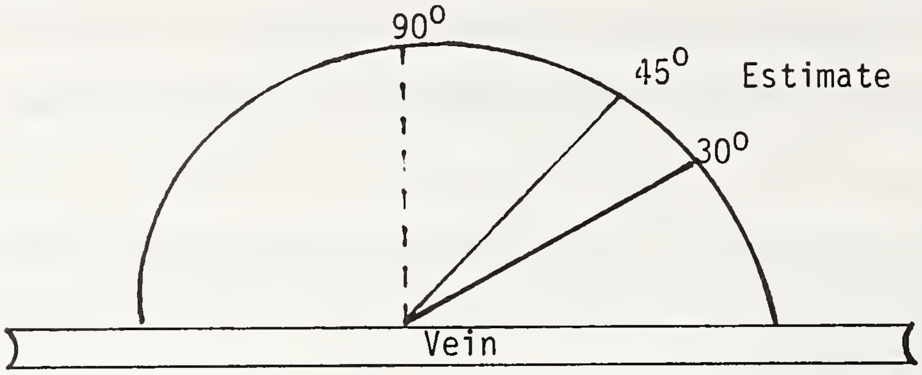


Figure 10

14. Go through the skin with the needle. Feel the vein directly above the needle.

15. Insert the needle either slowly or quickly. You know what feels best for you. Remember to maintain the angle.

16. You will feel a small "pop" or "pressure release" as you enter the vein.

17. When you feel the "pop" draw back on the plunger. If you have a good flow, level the needle and thread it into the vein.

18. Release the tourniquet, check your flow. If the flow remains adequate, clamp your needle line, tape the needle, and recheck the flow one more time.

19. <u>Repeat this procedure for your arterial stick</u>.

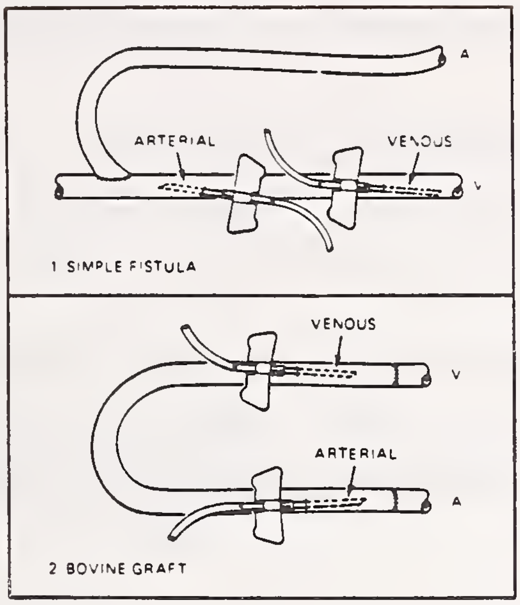


Figure 11

This figure shows two examples of where the needles may be placed for dialysis.

SOURCE: Jackle, Mary and Rasmussen, Claire. Renal Problems: A Critical Care Nursing Focus. Bowie, Maryland: Robert J. Brady, Co., 1980.

Fistula Problems

Suggested treatment measures are listed in the Fistula Problem Chart on page 181.

References

Should you need further reading material on fistulas at this point, the two following references are suggested. Ask your dialysis unit staff if they have them for you to borrow.

1. Extracorporeal Medical Specialties, Inc. Dialysis Education Series, Volume II. Care and Use of the Arteriovenous Fistula. King of Prussia, PA.: 1972.

2. Regional Kidney Disease Program, Minneapolis Medical Research Foundation, Inc. About Your Care . . . Vascular Access Surgery for Hemodialysis. Minneapolis, MN.: 1979.

B. <u>General Care for Shunts</u>

Listed below are some general care measures to be performed by you as you care for your own shunt. Your dialysis unit may have additional instructions for you. If so, insert them in the binder at this point.

<u>General Cleaning</u>

Cleaning of the exit sites will help prevent infections.

1. Organize your supplies on a table. Have a good chair and good light available.

2. <u>Wash your hands</u>.

3. Sit down and remove old dressings and tape.

4. Clean the exit sites of your shunt with a clean, sterile swab. Use the cleaning solution suggested by your dialysis unit. Always start at the exit site, itself, and proceed in a circular motion from inside to outside.

5. Dry the exit sites with dry sterile swabs.

6. Apply antiseptic ointment to the exit sites as prescribed by your dialysis unit.

7. Finally, wipe the entire plastic shunt tubing and connector with alcohol or Betadine®.

8. Apply clean dressings and tape. Stabilize the shunt with paper tape. Apply a sterile dressing over the exit sites, making sure the shunt is in a good alignment. Do not tape too tightly. Cover all with a soft gauze dressing, leaving the end loose so you can check the shunt for blood flow.

A Few Precautions with Shunts

1. Always carry cannula clamps. You should always carry cannula clamps (1" or 2" small bulldog clamps) with you. (A good place to keep them is clamped to the gauze dressing over your shunt.) They should always be on hand in case of accidental separation or damage. Place one on each side of the shunt to stop the bleeding if they separate accidentally.

2. Watch for complications. The common complications of shunts are:

   a. Bleeding
   b. Infection
   c. Clotting
   d. Poor Blood Flow
   e. Venospasm

   The chart in "Troubleshooting" offers suggested treatment (p. 183).

3. Do not puncture. Be very careful not to puncture the cannula tubing with anything sharp like a needle or scissors.

Connecting Yourself on Dialysis

If you have a shunt that is long enough or if it is in a good location you can connect yourself to the blood lines without assistance. You may wish to build or purchase a special clamping device to assist you.

UNIT 3 -- HOW THE ARTIFICIAL KIDNEY WORKS

The Dialyzer (Artificial Kidney)

The dialyzer, or artificial kidney, is a much simpler device than the human kidney. It is a simple filtering device. It has two main compartments and two main functions.

The two compartments are:

- Blood compartment
- Dialysis fluid compartment

Compartments. Your blood and the dialysis fluid are separated into two compartments so they cannot mix together. They are kept separate by a thin membrane, called a semi-permeable membrane. Semi means "part-way," and permeable means "to get through." It is called semi-permeable because it only allows the small-sized molecules (like urea and creatinine) to pass through. Larger molecules (like blood or germs) cannot pass through and therefore stay on their respective sides.

The membrane that separates the blood compartment from the dialysis fluid compartment can be made in the following ways:

- Flat sheet
- Coiled tube
- Hollow fiber

These membranes are enclosed in three basic dialyzers shown below. It is possible there may be others in the future.

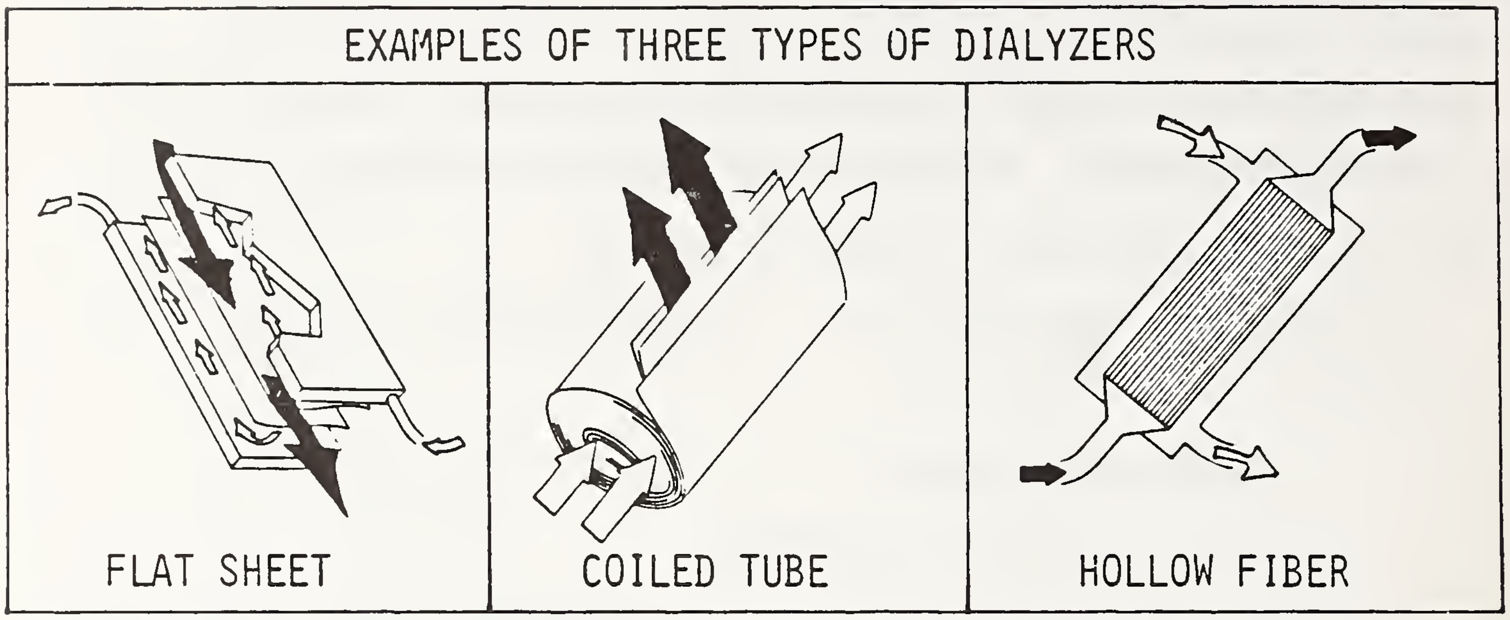


Figure 12

NOTE: The dark arrows show the direction of the blood flow. The light arrows show the direction of dialysis fluid flow.

Functions. The two main functions of the dialyzer are to:

- Remove waste products
- Remove fluid

The removal or filtering of waste products and fluids are accomplished by:

- Diffusion
- Ultrafiltration

Diffusion. The waste products are removed by a process called diffusion. Diffusion means that small particles called molecules move from an area where there are more of them (more concentrated) to an area where there are less of them (less concentrated). When this diffusion occurs from one compartment to the other through a membrane in a hemodialyzer, it is called dialysis.

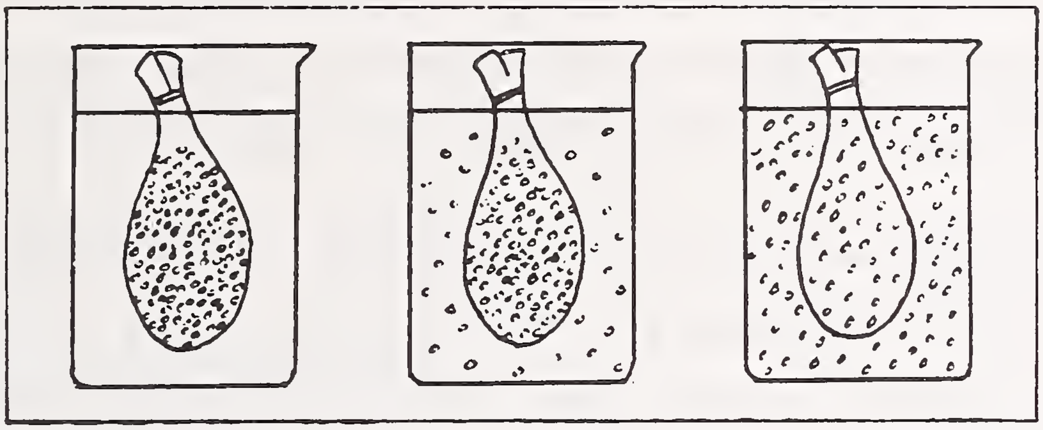


Figure 13: Principle of Diffusion

The amount of diffusion (or dialysis) that you need will be prescribed by your doctor. The amount is based on the effectiveness of the dialyzer to remove waste products and fluid. It is extremely important that you follow the doctor's instructions on the length of time prescribed and on the blood flow rate prescribed, so that the dialysis treatment will be most worthwhile for you.

Ultrafiltration. Ultrafiltration is the process used to remove excess fluid from your blood. Since your kidneys are not able to remove the fluids, the dialyzer is used to filter the excess fluid out.

Filtration means to move fluid through a membrane or screen. Think about how a coffee filter works. The filter holds the coffee grounds back, and only lets the water run through. The coffee filter can work by gravity alone, but gravity alone is much too slow for dialysis.

In dialysis, pressure is applied to speed up the process of filtration. By applying pressure it is possible to obtain more filtration than would be possible by gravity alone. This is called ultrafiltration. "Ultra" means more than the usual.

To understand further how ultrafiltration is achieved, you need to look at how the applied pressure works in the machine and dialyzer selected for your use. You will find that many companies make dialysis machines. However, most dialysis machines made will be either a negative pressure or a positive pressure type. Each type machine uses certain dialyzers and uses the applied pressure in different ways. The two types are explained below.

Negative Pressure Machine

This type uses a flat plate or a hollow fiber dialyzer. Ultrafiltration is achieved by using an applied pressure combination, the Transmembrane Pressure of negative pressure and positive pressure.

Negative pressure is a pressure applied which pulls or sucks the fluid through the filter faster than it would move itself. This pressure is applied to the dialysis fluid compartment.

Positive pressure is a pressure applied which pushes the fluid through the filter faster than it would move by itself. This pressure is applied to the blood compartment inside the dialyzer. This pressure can be measured in the venous drip chamber and is called the venous pressure. The venous pressure may be generated by internal resistance within the venous access or by applying a screw clamp on the venous line.

Transmembrane Pressure (TMP)

This is the combination of both negative and positive pressures to show you the total sum of the applied pressures. The higher the TMP is set, the more fluid removed. Once you figure your fluid amount to be removed, you will set your TMP (refer to the sample TMP Procedure, p. 133). Since the TMP is the sum of the negative and positive pressures, any change in the venous pressure affects the negative pressure setting.

You also need to check the dialyzer's limits in order to avoid rupturing the dialyzer.

Positive Pressure Machine

This type uses coil dialyzers. Ultrafiltration is achieved by using only positive applied pressure.

The applied pressure pushes the fluid through the filter faster than it would move by itself. This pressure is applied to the blood compartment inside the coil dialyzer and measured on a positive pressure gauge.

You maintain the pressure by using a screw clamp on the venous line. Think of this ultrafiltration as a wet sponge that you are squeezing the water out of. The more you squeeze, the more water you remove. Thus, the higher you run the positive pressure, the more fluid you remove. Even with a low positive pressure, you will remove some fluid. It is important to always maintain some positive pressure in order to avoid problems such as drawing dialysis bath fluid or air into the blood.

Fluid Volume Control
and
Transmembrane Pressure (TMP)

Introduction

As a self-dialysis patient you will be responsible for adjusting your fluid intake between dialysis treatments, as well as removing extra fluid during the dialysis treatment. You will learn to remove the extra fluid by calculating the transmembrane pressure (TMP) of your dialyzer and then setting your pressures at the appropriate levels to remove the excess.

Controlling Your Weight Between Dialysis Treatments

You are aware that since you are not putting out as much urine as in the past, you cannot now drink as much fluid as you have in the past. If you do not cut back on your fluid intake, you will notice some edema, your weight will increase, you may become short of breath, your blood pressure will rise, you will tire more easily and in general you will just be uncomfortable. Your dialysis treatments will also be more distressing since it is a strain on all of your body systems to take off the extra weight during dialysis.

The three basic steps to follow in learning to control your fluid volume are:

1. Follow your renal diet -- Your doctor has prescribed a certain diet for you. Your dietitian will work out a suitable plan for you considering your likes and dislikes, making it also very nutritious.

2. Follow your fluid allowance -- The amount of fluid you can take in in a 24-hour period has been prescribed. If you go above that limit you will gain too much fluid weight.

3. Weigh yourself daily -- Do not allow yourself to gain more than two pounds a day. If you notice more, cut back on your fluids. Always weigh first thing in the morning before you eat or drink.

Controlling Your Weight With Dialysis

If you have adequately controlled your weight between treatments, you should have gained between 3-4 pounds. During the dialysis you can take this weight off and you will be at your dry weight post-dialysis. (Dry weight is your weight with no extra fluid.) You will need to use ultrafiltration to remove excess fluids on dialysis.

> Ultrafiltration -- In the operation of a hemodialysis system, force is required to move the blood and dialysis fluid through their respective circuits. This force is called "pressure." Ultrafiltration is the removal of water from the blood as a result of a pressure across the membrane between the blood compartment and the dialysis fluid compartment. Ultrafiltration is determined by the sum of the negative pressure (in the dialysis fluid circuit) and the venous pressure (in the blood circuit). This becomes the transmembrane pressure.

TRANSMEMBRANE PRESSURE (TMP) PROCEDURE

Purpose: To calculate the TMP setting for this dialysis treatment.

TMP equals the sum of the venous pressure on the blood side of the dialyzing membrane (positive pressure) and the dialysis fluid pressure on the opposite side of the dialyzing membrane (negative pressure).

ESSENTIAL STEPS	EXPLANATION
1. Subtract dry weight from present weight.	(See Example, which follows, for all steps.)
2. Convert excess weight to cc.	2. 1 kilogram = 1000 cc.
3. Add saline prime, if given. Add rinse back. Add oral fluid intake during dialysis.	3. Any fluid you drink during dialysis, including Jello® and ice cream.
4. Divide total amount of fluid in-take by number of hours on dialysis.	
5. Divide the answer above by the number of cc.'s your dialyzer can pull off in an hour.	5. Example: 17 micron Gambro® dialyzer pulls off 2 cc. of fluid/hour/mm of pressure.
6. Final answer is TMP.	
7. Subtract venous pressure from desired TMP to determine dialysis fluid pressure (the negative pressure) you will set on your machine.	

EXAMPLE

(1)

69.6 Kg	present weight
- 68.0 Kg	dry weight
1.6 Kg	excess weight

(2) 1.6 Kg = 1600 cc

(3)

With Prime:		Without Prime:	
1600 cc		1600 cc	
+ 250 cc	prime	+ 250 cc	rinseback
+ 250 cc	rinseback	+ 400 cc	P.O. intake
+ 400 cc	P.O. intake	2250 cc	
2500 cc			

(4) 2500 cc ÷ 5 hrs. = 500 cc   2250 cc ÷ 5 hrs. = 450 cc

(5) 500 cc ÷ 2 cc = 250 TMP   450 cc ÷ 2 cc = 225 TMP

CHECK YOURSELF

Directions: Complete the statements below. Check yourself with the answers on the following page when finished. If you did not choose the correct answer, go back and read the material again.

1. The two compartments of the dialyzer are the ________ ________ and ________ ________ ________.

2. The functions of the dialyzer are to remove ________ ________ and remove ________.

3. Ultrafiltration is the process used to remove ________ ________ from your blood.

4. The membrane used in the dialyzer is called ________ ________ because it only allows certain substances to pass through.

5. In order to get negative pressure ultrafiltration there are two types of pressure which can be applied: ________ ________ pressure and ________ pressure.

6. In order to ultrafiltrate with positive pressure machines you may apply only ________ pressure.

7. Transmembrane pressure is a combination of ________ ________ and ________ ________.

ANSWERS

1. Blood compartment, dialysis fluid compartment

2. Waste products, fluid

3. Excess fluid

4. Semi-permeable

5. Negative, positive

6. Positive

7. Negative pressure, positive pressure

UNIT 4 -- WATER TREATMENT FOR HEMODIALYSIS

Water Treatment

There are several methods of water treatment available. You may need only one method or you may need several depending on the condition of the water in your own town. If you are going to do self-dialysis in your home you should have your water tested before you begin dialysis there.

Proper water treatment is very important. You should be sure your water meets the specifications recommended by your doctor before you begin treatment. Even the most pure water varies from time to time, so it is important to have a suitable water treatment system set up for your diaylsis.

Filtration

There are two types of filters used for water treatment:

- Sedimentary
- Adsorptive

Sedimentary filters trap small particles that are suspended in water. The sedimentary filter usually used for dialysis is a one micron filter which means that all particles larger than one micron are filtered out. (One micron is an extremely small measurement.)

Adsorptive filters hold on to certain liquids and gases. Examples of these are carbon filters (the most common in dialysis).

Ion Exchange

One common type of ion exchange treatment used in dialysis is water softening. If your water is "hard," it contains a lot of calcium and magnesium. Water softening equipment uses a process where the calcium and magnesium ions are exchanged for sodium ions.

Another form of ion exchange is deionization. This is a little more complicated in that instead of just removing calcium and magnesium, it removes all inpurities from the water.

Reverse Osmosis

Reverse osmosis (R.O.) is another method of getting pure water. Water is forced through a porous membrane with a great deal of pressure. Water samples are taken before it enters the R.O. and as it leaves the R.O. The two samples are examined and used to determine if your R.O. is working properly.

Your dialysis unit may request periodic water samples if you are on self-dialysis at home to check if your water treatment equipment is working well and to see if your water is safe for dialysis.

If you are on self-dialysis in a center, the water samples may be checked by the staff of the dialysis unit.

CHECK YOURSELF

Directions: Complete the following statements. If you do not have the answers, ask the dialysis staff to review the water treatment system with you.

1. In my area of the country the water used for dialysis needs to be treated in the following way:

____

____

____

____

2. I have a ______________ filter in my dialysis equipment because ______________________________

____

3. I do ________ or do not _______ need water softening in my water because ____________________________

____

____

UNIT 5 -- MONITORS AND ALARMS

Most of the dialysis equipment manufactured today has one or more alarm systems built into it, so that the dialysis can be monitored safely.

Alarms are of two types:

- Blood pathway alarms
- Dialysis fluid pathway alarms

The following monitors are alert for malfunctioning in the fluid system. An alarm will sound if there is a problem.

Dialysis Fluid Monitors:

- Negative pressure
- Temperature
- Conductivity

If a dialysis fluid alarm sounds, the machine will automatically go into "By-Pass" and the dialysis fluid will not be delivered to the dialyzer.

Blood Pathway Monitors:

- Air or foam detector
- Venous pressure

If a blood pathway alarm sounds, the blood pump will automatically stop, thereby stopping the blood flow.

Blood Leak Alarm

The blood leak alarm is both a dialysis fluid and a blood pathway alarm.

WHAT TO DO WHEN AN ALARM SOUNDS	
1	Check which alarm has sounded
2	Press silence/reset button (This shuts off noise for 60 seconds, but will not correct problem.)
3	Correct the problem

Figure 14

Alarm Procedures are listed in charts starting on p. 194.

UNIT 6 -- WORKING WITH STERILE SUPPLIES

Sterile Supplies

Everything that comes into contact with your blood during dialysis must be sterile. (Sterile means to be completely free of all germs.) Infections can occur when a sterile item comes into contact with germs and they get into your blood stream. Other descriptive terms for germs are bacteria or micro-organisms.

Germs are present everywhere. Special precautions can be taken to eliminate them. The two main methods are:

- Disinfection
- Sterilization

Disinfection reduces the number of organisms, but does not destroy them all. Betadine® is a commonly used disinfectant. It has the ability to destroy the most harmful germs but does not eliminate them all. Sterilization is a process that destroys all germs. Three methods used to sterilize are heat, chemical agents such as formaldehyde, and gases.

Dialysis patients need to learn how to work with sterile supplies. Many of the packaged supplies will come to you already sterilized. You will learn which parts you can touch with your bare (but clean) hands and which other parts you can only handle with sterile gloves.

Dialysis patients will learn how to disinfect. This involves scrubbing or soaking an item in a disinfectant solution such as Betadine® or alcohol.

Four common terms used when describing sterile or aseptic technique are:

<u>Sterile</u> -- completely free of all germs (bacteria or micro-organisms.)

<u>Clean</u> -- not completely free of germs, but disinfected so it is usable for certain steps in the dialysis procedure.

<u>Contaminated</u> -- a sterile item has touched or been touched by something that is not sterile; the item is now considered unsterile. (Germs from the unsterile item transfer to sterile item.)

<u>Dirty</u> -- similar to contaminated; item is neither clean nor sterile. Cannot be used for dialysis procedures where either clean or sterile is necessary.

How to Work with Sterile Supplies

There are a few rules you have to follow when you work with sterile supplies:

1. Always wear a mask, if this is your unit's procedure.
2. Wash hands thoroughly, according to your unit's procedure.
3. Keep the work area as clean as possible.
4. Do not cough, sneeze, or laugh over or near a sterile object.
5. Never use a package that is outdated, wet, or has a hole in it.
6. If you have sterile gloves on, keep your hands above your waist, in your field of vision.
7. If you drop anything on the floor, consider it contaminated, even if it is still wrapped.
8. <u>If you are not sure</u> if an item is sterile or not, consider it contaminated. Either discard it or resterilize it.

How to Keep a Sterile Field (Area) Sterile

1. A sterile field (area) is usually created by using an open sterile towel or dressing.
2. Do not leave a sterile field; keep it within your vision.
3. If you do need to leave for more than a few seconds, cover the field with another sterile towel or dressing.

4. Since air currents carry germs, do not wave sterile towels around and do not move sterile objects around.

5. When placing or dropping a sterile object on a sterile field, do not let the wrapper of the object touch the field.

6. Do not reach across a sterile field. Particles may drop from your arm, or you may accidentally touch a sterile object.

7. Since the edges of a sterile field are considered contaminated, do not place sterile items very near the edges.

8. Avoid spilling liquids on a sterile area. A <u>wet area</u> is always considered contaminated because germs can come up from the surface below by capillary action of the wet item.

<u>Four Basic Rules to Remember in Maintaining a Sterile Field</u>

- Sterile + Sterile = Sterile
- Sterile + Clean = Clean
- Sterile + Dirty = Dirty
- Clean + Dirty = Dirty

Needles, Syringes and Solutions

You will soon become comfortable in working with needles, syringes and solutions since they are part of every dialysis procedure. Examples of common needles and syringes used for hemodialysis are listed in the following charts.

NEEDLES

Size	Uses
15 or 16 Gauge	Start dialysis with fistula.
18, 21, or 22 Gauge	1. Draw up heparin and other medications. 2. Give injections into muscular tissue (IM for intra-muscular). 3. Draw blood for clotting times.
25 Gauge	1. Inject small amount of xylocaine under skin to numb it. 2. Use on venous pressure line. 3. Raise and lower level of blood in the drip chamber.

Figure 15

SYRINGES

Size	Uses
30 cc	1. Draw up pre-dialysis blood for lab tests. 2. Deliver heparin during dialysis by infusion pump. (50 cc. syringes also used.) 3. May be used to instill heparinized saline into needles before cannulation. 4. Use when more than 12 cc. of anything is needed.
12 cc	1. Give loading dose of heparin. 2. Draw up pre-dialysis blood for lab tests. 3. Use when need between 5-12 cc. medication. 4. Raise or lower level in drip bulb chamber.
3 cc with 25 gauge needle	1. Draw up and give xylocaine before fistula stick. 2. Draw up small amounts of medication. 3. Draw up small amount of pre-dialysis blood.

Figure 16

Hemodialysis -- Drugs and Solutions

Drugs. Two medications or drugs commonly used in the hemodialysis procedure are:

- Heparin
- Xylocaine

Heparin is a medication that is used to prevent your blood from clotting. It is usually given in a specific loading dose at the beginning of dialysis. Additional heparin may be given by a continuous infusion pump or at specific intervals, depending on your clotting times.

Heparin is packaged in 10 or 30 ml bottles that have rubber tops for repeated punctures. Whenever you receive a new supply of heparin, check the unit dose on the label. It is commonly prepared in bottles with 1000 units per milliliter (ml). Label your syringe with an "H" when you have the heparin drawn up in the syringe, as when you are preparing your dialysis loading dose or bolus.

Xylocaine is used to numb the arm for the fistula needle "sticks." The one percent (1%) solution strength is commonly used. It is packaged in 50 ml vials, that have reusable rubber tops. You can use it, taking it out repeatedly in small doses. Label this syringe with an "X" when the xylocaine is drawn up.

Solutions. One solution commonly used in hemodialysis is sterile normal saline. This is prepared as 0.9 percent sodium chloride, otherwise called normal saline. This is a salt preparation which comes in several sizes: 100 cc, 250 cc, 500 cc, and 1000 cc. It comes packaged in either glass bottles or plastic bags.

Saline is used in hemodialysis to:

- Rinse a dialyzer before dialysis,
- Rinse blood back at the end of dialysis,
- Prepare loading doses of heparin,
- Raise your blood pressure if it falls during dialysis,
- Dilute medications that go into your blood stream.

Sample Procedures

Two sample procedures on Drawing Up Solutions and Intramuscular (IM) Injections are given on p. 151 and 153.

DRAWING UP SOLUTIONS PROCEDURE

PURPOSE: To use sterile technique when drawing up sterile solutions.

EQUIPMENT NEEDED:

1 syringe

1 needle

1 bottle of solution or medication

2 alcohol wipes

1 marking pen

Essential Steps	Explanation
1. Review dialysis orders for medications	
2. Wash your hands	2. Reduces contamination.
3. Prepare the syringe	
a. Open syringe package	
b. Open needle	
c. Attach needle to syringe; secure tightly	
4. Draw up solution:	
a. Read label on bottle for name and dose.	a. Double-check again by reading the bottle you took off the shelf.
b. Check expiration date on bottle.	b. Expired medication will be ineffective.
(continued)	

DRAWING UP SOLUTIONS PROCEDURE (continued)

Essential Steps	Explanation
4. (continued)	
c. Wipe top of bottle with alcohol wipe.	c. Alcohol removes germs. (This is multiple-use bottle.)
d. Remove cap from needle.	d. Hold cap so open end does not become contaminated.
e. Draw air into the syringe equal to the amount of solution you plan to draw up.	
f. Hold bottle upside down.	
g. Insert needle on syringe through rubber stopper of bottle.	
h. Inject air from syringe into bottle	h. Without air, a vacuum is created making it difficult to withdraw solution.
i. Draw back the amount of solution desired into the syringe. Tap out air bubbles.	i. If air occupies space, there is less solution in syringe.
j. Remove syringe and needle from the bottle.	
k. Expell air bubbles into the air.	k. There should be no air bubbles in the syringe when you are ready to inject it.
l. Recap the needle.	
m. Check label of bottle again to be sure you have correct solution.	m. It is very important to be absolutely sure you have the correct solution.
n. Label syringe with marking pen with name of solution.	n. Since most solutions look like clear water, you need to mark them clearly.

SAMPLE

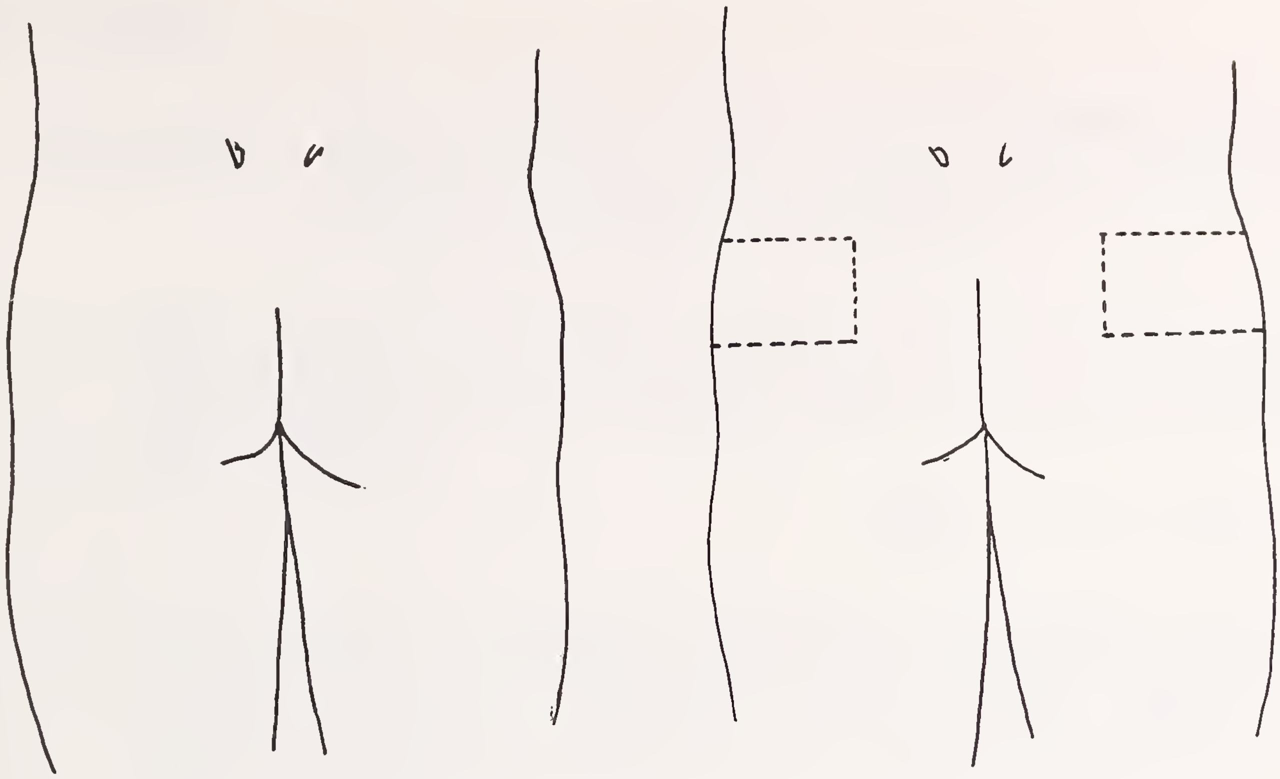
INTRAMUSCULAR (IM) INJECTION PROCEDURE

PURPOSE: To give medication by intramuscular injection, using sterile technique.

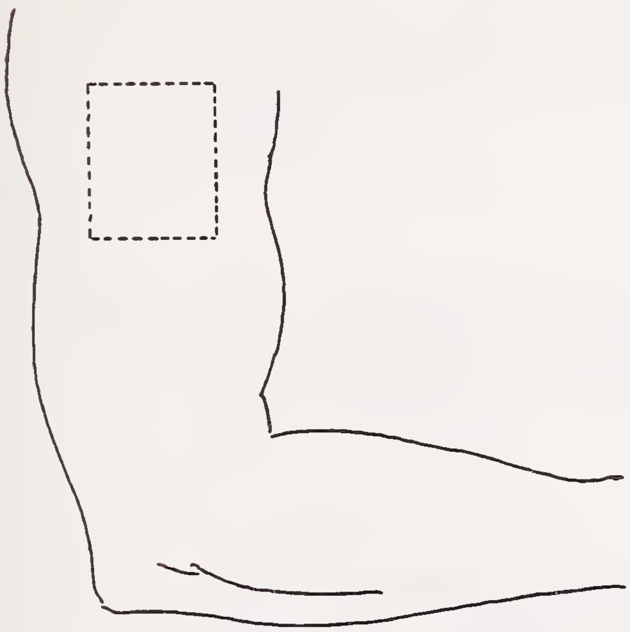
ESSENTIAL STEPS	EXPLANATION
A. Prepare the Medication	A. See previous procedure "Drawing Up Solutions"
B. Give the Injection	
1. Explore the area to be injected. (See drawings, following.)	1. First choice for an IM in-injection is the upper outer quadrant of the buttock. Use arm or leg if giving yourself.
2. Cleanse the area thoroughly with an alcohol prep pad.	2. Start at site of injection and continue outward in a circle.
3. Remove needle protector and hold syringe in right hand.	
4. With thumb and forefinger of your left hand, hold skin taut over injection site.	4. Need to have skin stretched taut to make it easier to puncture skin.
5. Insert the needle rapidly at 90 degree angle.	5. Straight into skin so it reaches muscle tissue.
6. Release hold on skin.	

ESSENTIAL STEPS	EXPLANATION
7. Draw back on plunger of syringe. Check to see if blood comes back in syringe. a. If you see blood, pull needle out and repeat entire procedure. b. If there is no blood in syringe, go on to the next step.	
8. Inject medication slowly.	8. Some medications burn or sting.
9. Withdraw needle rapidly.	
10. Massage the injection site lightly with the alcohol prep pad.	10. It takes away some of the sting.
11. Record the medication, amount, and time given.	
12. Dispose of needles and syringes properly.	12. Refer to your dialysis unit's procedure.

AREAS USED FOR GIVING IM INJECTIONS



Buttock - Upper Outer Quadrent



UPPER ARM

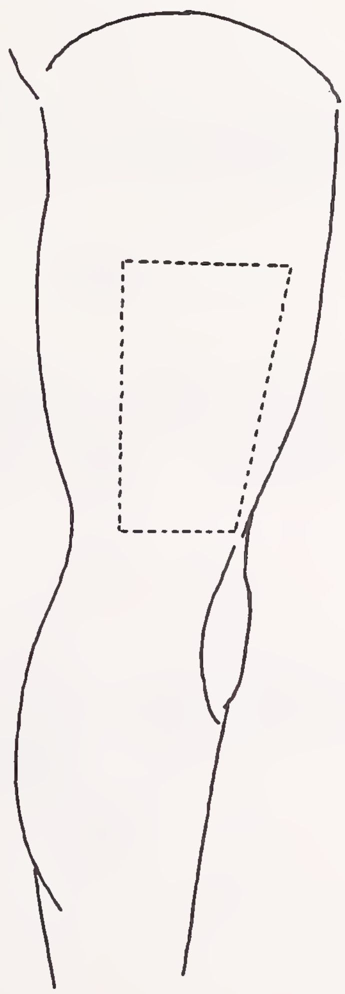


Figure 17

Mid-thigh
(outer aspect)

CHECK YOURSELF

Directions: Answer "Yes" or "No" to the following situations. Discuss the answers with your dialysis unit staff if you are unsure of the answers.

1. When you read the label on the bottle of heparin you see the expiration date is August 1979. Would you prepare the solution?

   Yes ______ No ______

2. As you begin to prepare the heparin solution, you forget to wipe the top of the bottle with alcohol, and put the needle through the rubber top. Should you continue with the procedure?

   Yes ______ No ______

3. In removing the medication from the bottle you touch the bedside stand with the needle. Is the needle contaminated?

   Yes ______ No ______

4. When beginning to open the syringe from its sterile package you drop the package on the floor. Would you use this syringe?

   Yes ______ No ______

5. When preparing your sterile field, you do not have a face mask on, and you sneeze as you are opening the sterile 4" x 4"'s. Is the field sterile?

   Yes ______ No ______

ANSWERS

1. No
2. No
3. Yes
4. No
5. No

CHAPTER 4 -- PROBLEMS ON HEMODIALYSIS

INTRODUCTION

A. When to Call the Unit -- Hemodialysis Problems

Call The Dialysis Unit Staff If You Have Any of the Following Problems Regarding the Hemodialysis Treatment:

1. Major blood leak during treatment.

2. Malfunctioning conductivity meter.

3. Excessive fibrin collecting in blood tubing during dialysis.

4. Clotted dialyzer or access.

5. Signs of infection around shunt or fistula--redness, swelling, tenderness, drainage.

6. Low blood flow during dialysis (unable to get it up to prescribed blood pump speed).

7. Low blood pressure that does not go up after giving saline.

8. Any problem with your equipment that would prevent dialysis at the next scheduled time.

9. Any questions about your treatment.

Call these numbers to notify the staff:

____

____

____

B. <u>When to Call the Unit -- General Problems</u>

<u>Call The Dialysis Unit Staff If You Have Any of the Following Problems</u>:

1. Severe pain anywhere.

2. Elevated temperature--100^{0}F. or higher (or 99^{0}F. steadily for a long time). Use 38^{0}C. if you have a centigrade thermometer.

3. Excessive bleeding--black tarry stools, coffee-ground vomit, easy bruising of skin, shunt or fistula bleeding.

4. Irregular heart beats--skipping beats, or over 120 or under 60 beats per minute.

5. A skin reaction such as a rash or hives which you suspect might come from drugs you are taking.

6. Constant headaches.

7. Nonspecific symptoms--diarrhea, nausea and vomiting, dizziness, shortness of breath or tightness in chest, extreme fatigue or weakness.

8. If you have an accident (car, fall, etc.).

Your dialysis staff will give you instructions about what to do. Phone numbers:

____

____

____

UNIT 1 -- PROBLEMS RELATED TO YOURSELF

Medical Problems

Since the kidneys influence the effects of several of the other body systems, you have other medical problems besides a decrease in the amount of urine you make when you have kidney disease.

The common problems are listed below and discussed briefly. It is important that you be aware of these so that you can report symptoms (your feelings) before serious complications set in.

- Cardiac or heart problems
  - High blood pressure or hypertension
  - High potassium levels or hyperkalemia
  - Pericarditis or inflammation of the sac around the heart
- Anemia or low red blood cell count
- Bone Disease
- Nerve damage or neuropathy in hands and feet
- Skin problems such as itching and darkening color

Serum hepatitis is a special problem for people on dialysis. It is described separately in this unit on p. 173.

1. Cardiac or Heart Problems

a. High Blood Pressure or Hypertension

There are two main reasons for high blood pressure in the dialysis patient. One theory is that the damaged kidneys produce too much renin (a hormone) which makes the blood pressure go up. Another is that the damaged kidneys cannot control the amount of sodium (salt) and fluid in the body. Holding on to salt and fluid causes problems such as swelling of hands and feet (edema). Coughing and difficulty in breathing may indicate that fluid is collecting in your lungs. As the fluid continues to collect in your body, and as the blood pressure starts to climb, you may have a greater chance for a heart attack or a stroke. Your weight will go up as fluid accumulates in your body. During the dialysis procedure you will have to use higher pressures to remove the excess fluid.

b. High Potassium Levels or Hyperkalemia

The normal potassium level is 3.5 to 5.5 mEq. When higher, it is dangerous because it can cause serious disturbances in the regularity of the heart beat as well as stopping the heart beats altogether causing death.

Symptoms of hyperkalemia include muscle weakness, making it hard to walk, holding your head up or holding on to things. Report these symptoms to the dialysis nurse or doctor.

Healthy kidneys are able to filter the excess potassium out. Since your damaged kidneys are not able to do it, you must be careful about your choice of foods and avoid any foods that are especially high in potassium.

c. Pericarditis (Inflammation of the Sac Around the Heart)

Pericarditis can be caused by viruses or bacteria (germs) in patients who are very ill with kidney disease. A symptom of pericarditis may be a constant pain in the center of the chest which is relieved by sitting up and taking deep breaths.

2. Anemia (Low Red Blood Cell Count)

Most patients on dialysis are anemic -- that is, their red blood cell count is around 20 percent. Most people with normal kidney function have 40 to 45 percent red blood cells in their blood stream. (The test to check the red blood cell count is called the Hematocrit, or sometimes "crit" for short.) Some persons with polycystic kidney disease do not, however, have this problem.

Anemia occurs in the patient with chronic renal failure because the waste products that accumulate in the blood stream cause a depression in the activity of the bone marrow where the red cells are made. Fewer red cells are made and the ones that are made have a shorter life span. Also, if there is an excess loss of blood in the dialyzer, this increases the possibility of signs of anemia.

Symptoms of anemia include increased tiredness, increased irritability or crabbiness, shortness of breath, chest pain, dizziness, irregular heart beats (arrhythmias), and sometimes chronic hypotension (low blood pressure). Most of the time, the anemia found in kidney failure is not bad enough to cause these symptoms, but if you do notice them, notify your dialysis unit staff.

Anemia can be treated by adding certain vitamins and iron supplements to your dietary intake. Testosterone, a male hormone, or other similar medication, may be given by injections (shots) since it stimulates the body to produce more red blood cells and helps build muscle mass.

Because aspirin affects the blood clotting mechanism of your body and leads to more bleeding which may aggravate the anemia, <u>it is recommended that you check with your doctor before you take any aspirin</u> or any drugs containing aspirin (such as Bufferin®, Anacin®, or Alka-Seltzer®).

Blood transfusions are usually avoided as treatment of anemia for renal patients. Your doctor will advise you about this.

3. Bone Disease

Calcium and phosphorus are two minerals that are necessary to build strong bones. The "see-saw" relationship of the calcium and

phosphorus balance is described more fully with the dietary information in Chapter 2. With kidney disease, an imbalance occurs that makes kidney patients very susceptible to fractures and broken bones. Even the stress of coughing or sneezing may cause fractures.

The process of destroying the bone is a very long, slow process and you may not be aware of any immediate problem. A blood test measuring the level of the parathyroid hormone may be done routinely and the problem may be noted. Signs and symptoms include:

- Bone pain, in the arms and legs or the ribs or spine
- Unexpected fractures, such as a rib fracture after coughing or sneezing
- Headaches because of a high calcium level
- Nausea and vomiting
- Loss of appetite
- Depression
- Constipation
- Itching (many patients with renal disease have some degree of itching, without bone disease)

4. Nerve Damage or Neuropathy

Neuropathy or nerve damage is thought to be related to the accumulation of waste products in the body. These wastes may damage the nerves directly or they may interfere with the ability of certain vitamins and nutrients, which you take in as food, to reach the nerves.

The symptoms of nerve damage are numbness and tingling of the feet (especially the balls of the feet), burning feeling in the toes and soles of the feet, weakness of the feet and legs, with difficulty in walking. If you develop any of the above symptoms, notify the dialysis doctor or nurse. The doctor may order nerve conduction studies to determine the amount of nerve damage.

The treatment and prevention of neuropathy are adequate dialysis time, as well as adequate diet with some vitamin supplements. If you have neuropathy, your dialysis time may be increased and tests will be done to determine if other treatment might be necessary.

5. Skin Problems (Itching and Darkening Color)

Almost all patients with renal failure have dry, scaly skin with some degree of itching. It is fairly common when dialysis is first started, but should lessen after you have been on dialysis for several weeks

Treatment may be longer dialysis sessions, such as adding 30 minutes or an hour to each dialysis treatment. Bath oils and lanolin skin preparations are sometimes soothing. If the itching is due to a drug reaction, however, your doctor may prescribe an antihistamine to relieve the itching.

A change in the color of the skin may develop in patients with renal failure because the pigments (color particles) that are normally eliminated by the kidneys cannot be discharged when the kidneys are damaged. This change in skin color may also be due to the anemia. It is a cosmetic problem, and is not dangerous.

CHECK YOURSELF

Directions: Complete the following questions. If you are not sure of the answers, go back and read the material again.

1. The hypertension (high blood pressure) of the dialysis patient is due to:

   a. ______________________________

   b. ______________________________

2. The normal potassium level is ________ to ________ mEq. High levels are dangerous because they cause __________ ______________________________

3. The main symptom of pericarditis (inflammation of the sac around the heart) may be ______________________________ ______________________________

4. Symptoms of anemia are (name at least five):

   ____

   ____

   ____

   ____

   ____

5. Bone disease is characterized by a "see-saw" relationship of the __________________ and ___________________ balance.

6. The symptoms of nerve damage (or neuropathy) are ______ _______________ and ____________________ of the feet.

7. Treatment for the itching that accompanies renal failure may be ____________________ dialysis sessions, or sometimes lanolin ____________________ _________________________ are helpful.

ANSWERS

1. Production of too much renin (or hormone), kidneys unable to control the amount of salt and water in the body.

2. 3.5 to 5.5 mEq., irregularities in the heart beat.

3. Constant pain in the center of the chest.

4. Any five: increased tiredness, increased irritability or crabbiness, shortness of breath, chest pain, dizziness, irregular heart beats, chronic hypotension.

5. Calcium, phosphorus.

6. Numbness, tingling.

7. Longer, skin preparations.

Hepatitis

Hepatitis is an infectious, contagious disease caused by a virus that damages the liver. It is most important that people on dialysis as well as their families know about this condition. This is especially true for patients on hemodialysis.

The types of hepatitis are:

- Infectious, or Type A, hepatitis
- Serum, or Type B, hepatitis
- Non-A, Non-B hepatitis

Infectious hepatitis, Type A, is usually transmitted by close contact with other people who are carriers of the virus through contaminated food, water or body secretions.

Serum hepatitis, Type B, is usually transmitted by contaminated blood, such as being struck with a used needle or getting contaminated blood on a cut or on bruised skin where it could easily enter the blood stream. All dialysis patients need to take special precautions to avoid contacting serum hepatitis.

Non-A, Non-B hepatitis is a condition that cannot be identified as either Type A or Type B hepatitis. All dialysis patients need to also be wary of this, particularly the hemodialysis patients.

Symptoms to Report

- Slowly increasing tiredness
- Loss of appetite

- Nausea, vomiting
- Yellowing of the skin and eyes
- Joint pain and muscle aches
- Brown colored urine
- Clay colored stools (bowel movements)
- Itching skin
- Dull pain in right upper abdomen

How to Tell If You Have Hepatitis

Hepatitis is usually diagnosed in the early stages from the routine monthly blood tests. The following suggests the presence of hepatitis virus in the blood:

- Rise in bilirubin level
- Rise in liver enzymes
- Appearance of hepatitis B surface antigen (HB_SAg)
- Appearance of hepatitis B core structure (HB_CAg)

There may be special dialysis stations set aside for "positive" patients at your dialysis unit. The serious implications of carrying the hepatitis virus are especially important if you wish to travel. Some dialysis units do not permit positive patients to use their units, since the virus is so easily spread.

The Treatment for Hepatitis

The treatment usually consists of bed rest and adequate diet. This seems to be the only therapy that appears to help at present. The management of the diet is extremely important. If loss of appetite and/or nausea and vomiting are severe, you may need to be hospitalized. You may get over the acute stage of the disease rather quickly but then it is possible to remain a chronic carrier of the virus.

Precautions to Take to Protect Your Family

It is difficult, and inadvisable, to maintain a total state of separateness from your family if you are carrying the hepatitis virus. Listed below are some precautions you must follow. Your dialysis staff may advise you on others.

When you are at home:

- Keep your hands clean by washing frequently.
- It is advisable for you to have a separate razor, comb, and nail cutter from the rest of the family.
- If you have guests coming into your home, and if you have two bathrooms, advise the guests to use the one for guests.

When you are away from your home:

- If you need to use a public bathroom facility when you are out, it is advisable that you dispose of your towels and tissues carefully.
- If you are with others who will come in contact with your blood (barbers, dentists, hospital labs, etc.) inform them that you are carrying the hepatitis virus.

When you are on dialysis:

- Avoid eating and smoking on dialysis if you are on self-dialysis in a dialysis unit.
- For hemodialysis patients: Wear gloves as instructed. Artificial kidneys, needles, syringes, and blood lines should be disposed of as instructed by your dialysis unit staff.

CHECK YOURSELF

Directions: Cover the answers below. When finished completing the exercise, if your answers do not compare with the answers given, go back and read the material again.

1. List the types of hepatitis:

   a. ____________________ c. ____________________

   b. ____________________

2. Hemodialysis patients need to be wary of ____________________ because of the frequent exposure to blood in dialysis units.

3. Hepatitis is usually diagnosed in the early stages from routine ________________ ____________________.

4. Describe what your dialysis staff has advised you regarding hepatitis precautions in your own home:

   ____

   ____

   ____

ANSWERS

1. Infectious hepatitis, serum hepatitis, Non-A, Non-B hepatitis
2. Serum hepatitis
3. Blood tests
4. Your own answer

UNIT 2 -- PROBLEMS RELATED TO VASCULAR ACCESS

Fistula or Graft

You may have problems regarding your internal fistula or graft either during the dialysis treatment or on non-dialysis days. Some of these were referred to earlier in the "Care of Your Vascular Access" section. Your dialysis unit staff will advise you what to do about your specific situation when you call. Refer to Fistula or Graft Problem Chart on p. 181.

Shunt

The most common problems with shunts either on or off dialysis are clotting, bleeding and infection. Call the dialysis unit for help about your specific situation. See Shunt Problem Chart on p. 183.

DEFINITIONS OF TERMS USED ON FISTULA PROBLEM CHART

Hematoma -- Bruise made by blood from the blood vessels getting into the surrounding tissue. Due to either trauma or piercing a vessel wall.

Infiltration -- Penetrating a blood vessel wall by a needle; allowing blood from vessel to move to tissue.

Venous Spasms -- Uncontrollable contraction (opening and closing) of the vein.

Poor Blood Flow -- The speed of the blood to and from the dialyzer is too slow.

Scar Tissue -- Hardened skin or tissue that is left after a wound or lesion is healed.

Clotting -- A semi-solid mass of blood forming, causing blood flow to stop.

Aneurysm Formation -- A section of a blood vessel enlarges, and expands out of its usual shape.

Steal Syndrome -- Feeling of numbness or tingling in the arm or leg where the blood access is; due to change in blood flow.

Infection -- The state of being diseased; from the process of having germs in the body or germs introduced at a specific entry point.

Fistula or Graft Problem Chart

Problems	Immediate Treatment
Hematoma	Apply ice for first 12 hours to reduce swelling. After that, apply warm soaks for at least two days.
Infiltration	Apply ice for first 12 hours to reduce swelling. After that, apply warm soaks for at least two days. Elevate extremity.
Venous Spasms	Warm soaks usually decrease spasm by causing vessel dilation.
Poor Blood Flow	Varied Causes: Improper needle position, reposition needle; hypotension, give small amount saline; narrow vessel, may indicate need for fistula revision.
Scar Tissue	Change venipuncture sites to lessen chance of developing; apply adequate pressure after removing needles to heal wounds; consider single needle dialysis.
Clotting	Notify dialysis staff. Detected by noting absence of bruit (broo'ee) or thrill, the vibration or buzz felt or heard over the venous side of fistula.
	Later Complications
Aneurysm Formation	Usually needs fistula revision. From repeated venipunctures in same area of vessel or from gradual weakening of vessel wall.
Steal Syndrome	Needs fistula revision. Occurs when more blood flows through fistula than to area below it; like in hand, for example.
Infection	Occur anytime. Nofity dialysis staff for specific treatment.

Figure 18

DEFINITION OF TERMS USED IN SHUNT PROBLEM CHART

Bleeding -- Blood flowing out of a blood vessel, abnormally.

Infection -- The state of being diseased; from the process of having germs in the body, or germs introduced at a specific entry point.

Clotting -- A semi-solid mass of blood forming, causing blood flow to stop.

Poor Blood Flow -- The speed of the blood to and from the dialyzer is too slow.

Venospasm -- Uncontrollable contractions (opening and closing) of the vein.

Shunt Problem Chart

Shunt Problems	Immediate Treatment
Bleeding	Small amount: not an emergency, but note when bleeding occurred in relation to dialysis, activity, etc. Moderate amount: may be early indication that cannula is slipping out. Notify your emergency number. Large amount: THIS IS AN EMERGENCY! To stop the bleeding: • Pinch tubing with fingers. • Apply cannula clamps to both arterial and venous sides. • Apply tourniquet above the cannula. Apply pressure dressing or press with hand. • Go to nearest Emergency Room or Rescue Squad. • Call physician from there.
Infection	Report redness, swelling, pain, drainage and/or fever. Report promptly so treatment can be started. Have culture and sensitivities done at your hospital.
Clotting	If the pulse is absent, if particles of fibrin are noted in the cannula, if shunt feels cool, notify your emergency number that you are coming in for a declot procedure.

Figure 19

SHUNTS (continued)

Shunt Problems	Immediate Treatment
Poor Blood Flow	This is usually discovered during a dialysis treatment. Notify your dialysis unit staff if you cannot maintain an adequate blood pump rate.
Venospasm	This happens on dialysis resulting in a high venous pressure in dialysis. Apply warm moist pads, from the wrist to the underarm. If this is not effective, notify the dialysis unit staff.

Figure 19 (Continued)

UNIT 3 -- PROBLEMS RELATED TO THE DIALYSIS PROCEDURES

Management of Hypotension and/or Shock

A drop in blood pressure may be experienced while on dialysis. Depending upon each individual, symptoms will vary. Signs and symptoms include dizziness, blurry vision, cramps, sweating, nausea, vomiting, decreased blood pressure, increased or decreased pulse rate, fainting and possibly seizures. Causes of hypotension include:

1. Fluid removed too rapidly.
2. Excessive fluid removal.
3. Blood loss.
4. Antihypertensive medications.

If you learn to focus on the early symptoms, you can start taking preventive measures (change position, turn off negative pressure, etc.) when they begin to occur. You may avoid a crisis by paying attention to early signs and symptoms.

Sample Procedures

There are four sample procedures starting on the next page. Your dialysis unit staff may want to use these or add their own.

HYPOTENSION (LOW BLOOD PRESSURE) PROCEDURE

ESSENTIAL STEPS*	RATIONALE
1. Check BP.	
2. If BP drops, get into a flat position and elevate the legs.	2. If this keeps the BP steady without symptoms, this may be the only thing necessary to do.
3. Shut off the negative pressure.	3. This will decrease the ultrafiltration rate.
4. Recheck BP and pulse.	4. When the BP drops, the pulse rate will usually increase. (Notify the dialysis staff if the pulse drops below 60.)
5. If BP continues to drop, administer 100 cc's of normal saline.** Remove all hemostats from the saline line.	(**Your unit may have a procedure for using hypertonic saline instead.)
6. Recheck BP and pulse.	
7. Give additional normal saline, amount approved by your dialysis unit. If there is no change after administering saline, notify the dialysis staff or doctor.	

* You may have to notify your assistant if you feel your blood pressure dropping, and the assistant will continue with the procedures.

<u>HYPOTENSION PROCEDURE</u> (continued)

ESSENTIAL STEPS	RATIONALE
8. If unable to reach dialysis staff or doctor, discontinue dialysis by usual procedure. 10. <u>Assistant</u>: In the event of a hypotensive seizure or loss of blood, continue the above steps by replacing fluid volume and giving emergency support. Notify the dialysis staff or doctor.	8. After giving back blood, BP may increase.

CHANGING A CLOTTED DRIP CHAMBER PROCEDURE

PURPOSE: To change the drip chamber if clots are present and causing high venous pressure.

EQUIPMENT NEEDED:

1. Hemostats (5)
2. Drip chamber with filter
3. Betadine® swabs
4. Sterile scissors
5. Gloves
6. Sterile 4" x 4"'s

ESSENTIAL STEPS	RATIONALE
1. Turn off blood pump and place 2 hemostats above, and 2 hemostats below venous drip chamber.	1. To prevent loss of blood after drip chamber is removed.
2. Clean tubing between hemostats with Betadine® swabs. Using sterile scissors, cut out clotted drip chamber.	2. To prevent contamination of blood.
3. Take new venous drip chamber and clamp off monitor line with hemostat.	3. To prevent blood from entering monitor line.
4. Remove top red cap and attach top portion of venous drip chamber to tubing which is connected to kidney. Invert drip chamber.	4. Drip chamber is inverted to expel air.
(continued)	

CHANGING A CLOTTED DRIP CHAMBER (continued)

ESSENTIAL STEPS	RATIONALE
5. Remove hemostat from above drip chamber and remove red cap on the drip chamber.	
6. Turn blood pump on slowly and allow drip chamber to fill 3/4 full.	
7. Turn off blood pump. Keeping drip chamber inverted, attach venous blood line to drip chamber.	
8. Turn drip chamber right side up. Observe line for air and be sure to get all air out.	8. A small air bubble may be at bottom of drip chamber. You can get this out by tapping it up to top.
9. Connect monitor line and unclamp the hemostat. Place line in line clamp.	
10. Turn on blood pump slowly and observe line closely for air.	
11. Resume blood pump speed and recheck line clamp. Observe level of drip to make sure it does not drop.	

BLOOD LEAK PROCEDURE

PURPOSE: To respond to leaking or ruptured dialyzer and to take the proper corrective measures.

(NOTE: A blood leak usually occurs just as you are going on. When a blood leak alarm is activated, VISUALLY CHECK THE DIALYSATE OUTFLOW HOSE.)

ESSENTIAL STEPS	RATIONALE
If dialysate is red:	
1. You must change the artificial kidney and the blood lines.	1. The tear is large enough for blood and dialysate to mix; therefore, blood is contaminated.
2. Clamp arterial and venous lines with hemostats; and throw away entire setup.	2. Avoid possibility of infection from contaminated blood.
3. Flush each needle (A + V) with saline and drip slowly (or attach saline-filled syringes).	3. Flush to keep needles from clotting.
4. Prepare new artificial kidney and blood lines.	

ESSENTIAL STEPS	RATIONALE
If outflow hose is clear:	
1. You must check dialysate outflow with a Hemastick.	1. To check if there is a blood leak that cannot be observed with the naked eye.
2. Disconnect dialysate outflow hose; place basin under outflow port.	2. Outflow hose is used to test dialysate that has gone through the kidney. Basin will catch drainage.
3. Place a Hemastick so the outflow dialysate wets the stick.	3. The stick will change color (blue) if blood cells are present.
4. Re-connect dialysate outflow hose and proceed: a) If no color change on stick, follow steps for negative. b) If any shade of blue, follow steps for positive.	

NEGATIVE HEMASTICK TEST

ESSENTIAL STEPS	RATIONALE
1. Push reset button.	1. If it was caused by an air bubble, it should reset.
2. If blood leak alarm continues to sound, desensitize alarm on machine.	

POSITIVE HEMASTICK TEST

ESSENTIAL STEPS	RATIONALE
<u>If dialysate is cloudy</u>:	
1. You must come off, but you may get all your blood back.	1. As long as the dialysate is clear, the tear is small enough to prevent dialysate from entering the blood compartment.
2. Lower pressure to 50.	2. To prevent dialysate from entering blood compartment.
3. Take off in usual manner, but <u>do not</u> pull arterial needle or venous needle.	3. To preserve access for "going on" again.
4. Flush each of the A and V needles with saline and maintain slow drip (or attach saline-filled syringes).	4. To keep the needles from clotting while you set machine up again.

IMPORTANT POINTS:

1. If dialysate is cloudy, you may get your blood back.
2. If dialysate is red, you lose entire setup. Any time during "coming off" that dialysate changes pink to red, stop dialysis and lose the remaining blood.
3. If over 1/2 hour has elapsed before going on again, give heparin dose according to your dialysis unit's procedure.
4. Report blood loss to your dialysis staff.
5. If the artificial kidney was defective, follow your dialysis unit's procedure for reporting to the supplier.

ALARM PROCEDURES

Three possible types of alarms include:

I -- Low Arterial/Low Venous
II -- High Arterial/Low Venous
III -- High Venous/High Arterial

I. Low Arterial, Low Venous

This is always an arterial problem. The lines usually jump or collapse. The problem exists anywhere in the blood line from the arterial needle to the top of the arterial drip chamber. It is registered as a low arterial alarm because the supply demanded by the pump is not met so the lines collapse creating a vacuum.

PROBLEM	SOLUTION
1. Needle placement in inadequate vein or against vessel wall (unable to meet demand set due to poorly developed vessel at that point, or blocked flow since against the wall).	1. Lower pump speed, reposition needle. If unable to get at least 175 cc/min. blood flow, replace needle.
2. Arterial needle clotted.	2. Draw back with a syringe to try to aspirate the clot. If unable to remove clot, replace needle.
3. Kink in arterial line anywhere from patient to top of arterial drip chamber.	3. Unkink.

II. <u>High Arterial, Low Venous</u>

This causes a delta pressure change. Delta pressure is the arterial pressure minus the venous pressure. Check the blood line from the arterial drip chamber to the kidney, and to the top of the venous drip chamber.

PROBLEM	SOLUTION
1. Kink in lines.	1. Unkink line.
2. Clotted kidney.	2. Replace artificial kidney and blood lines.

III. High Arterial, High Venous

This is a venous problem only. The problem is anywhere in the blood line from the venous drip chamber to the venous needle.

PROBLEM	SOLUTION
1. Kink in venous line.	1. Unkink line.
2. Malpositioned venous needle.	2. Reposition needle.
3. Infiltrated venous needle.	3. a) Turn off pump. b) If it is going to take a long time to change the needle, recirculate the blood according to your dialysis unit's procedure. c) Flush arterial needle with saline. d) Insert new venous needle <u>above</u> old one. e) Reattach needles to blood lines and resume treatment.
4. Clotted venous needle.	4. If there are no kinks, and repositioning doesn't help, turn off the pump and double clamp the blood line at the venous connection. Check to see if there is backflow by attaching a syringe with saline to the needle and pulling back. If great resistance: (continued)

III. High Arterial, High Venous (continued)

PROBLEM	SOLUTION
4. Clotted venous needle (continued)	a) Clotted needle: try to aspirate clot. If unable, insert new needle. b) If no resistance, push in and see if resistance is increased. c) Insert new venous needle if necessary.
5. Vessel in spasm.	5. a) Apply warm towel or heating pad to arm. b) Slow pump until vessel relaxes (about 1/2 hour).
6. Clotted venous drip chamber.	6. Able to see clot as a black ring around base of drip chamber. a) Turn off blood pump. b) Clamp bottom of drip chamber. c) Tip over and tap with hemostat to see if there is a clot. d) Set back up and re-tap to get rid of air bubble (air rises). e) Change drip chamber if clotted.* (See procedure in this section.)

*Some units prefer you change the entire venous line, instead of just the venous drip chamber.

UNIT 4 -- TROUBLESHOOTING CHART (HEMODIALYSIS)

Introduction

The following pages need to be completed by the staff of your dialysis unit. They will fill in what their recommended treatment is for you in the various situations.

The Troubleshooting Chart has been placed here so you are able to learn the easier things first. After you have learned all the other material, you may want to move the Troubleshooting Chart to the front of your manual.

TROUBLESHOOTING FOR COMPLICATIONS ON HEMODIALYSIS

NOTE: Your dialysis unit staff will fill in their instructions for you in the space provided.

1. SERIOUS

PROBLEM	SIGNS AND SYMPTOMS
A. Headache, cramps, back pain	May be accompanied by high blood pressure, nausea, vomiting; anxious.
TREATMENT:	
B. Angina (chest pain)	Low hematocrit, complains of chest pain, irregular heart beats.
TREATMENT:	
C. Hypotension (low blood pressure)	Gradual fall in blood pressure, dizziness, nausea or vomiting, blurred vision, "clammy" feeling, sudden fatigue, yawning, headache.
TREATMENT:	

TROUBLESHOOTING FOR COMPLICATIONS ON HEMODIALYSIS

II. MORE SERIOUS

PROBLEM	SIGNS AND SYMPTOMS
A. Fever/chills	Temperature 100^{0} or more, flushed, shaking chills, headache, general fatigue.
TREATMENT:	
B. Convulsions or focal seizures	May be preceded by headache, nausea, increased blood pressure, projectile vomiting. Comes on suddenly.
TREATMENT:	
C. Arrhythmias (irregular heart beats)	Irregular heart beats, shortness of breath. May also have low blood pressure.
TREATMENT:	

TROUBLESHOOTING FOR COMPLICATIONS ON HEMODIALYSIS

II. MORE SERIOUS (continued)

PROBLEM	SIGNS AND SYMPTOMS
D. Muscle cramps	Muscle spasms in legs, feet, hands, abdomen. Blood pressure may be low.
TREATMENT:	
E. Nausea and vomiting	May have headache, and either high or low blood pressure.
TREATMENT:	

TROUBLESHOOTING FOR COMPLICATIONS ON HEMODIALYSIS

III. EMERGENCIES

PROBLEM	SIGNS AND SYMPTOMS
A. Air embolism	Air seen in venous line, chest pain, coughing, bluish color to skin, "seeing stars," confused, coma.
TREATMENT:	
B. Hemolysis (red blood cells have leaked out of blood because of incorrect dialysate concentration)	"Cranberry juice" (clear) blood in venous line. Burning at site of venous blood return, warmth in throat, chest pain, and difficulty breathing, irregular heart beats.
TREATMENT:	
C. Too hot dialysis fluid (Hyperthermia)	Feel hot, very dark red blood, eventual coma.
TREATMENT:	

III. EMERGENCIES (continued)

PROBLEM	SIGNS AND SYMPTOMS
D. Loss of consciousness	Unresponsive, unable to arouse.
TREATMENT:	
E. Cardiac arrest	Pulses absent, heart beat stopped.
TREATMENT:	
F. Bleeding* (source of bleeding usually obvious--see below)	Spurting blood noted if technical cause. For internal bleeding; shock (blood pressure low or absent), convulsions, vomiting, black tarry stools or vomiting blood if GI bleeding.
TREATMENT:	

*Causes of bleeding:

1. Accidental separation of blood lines
2. Needles accidentally out of place
3. Ruptured blood lines
4. Ruptured dialyzer (artificial kidney)
5. Separation of external shunt
6. Mild to severe oozing around fistula needles
7. Internal bleeding

CHAPTER 5 -- BASICS OF PERITONEAL DIALYSIS

UNIT 1 -- PRINCIPLES OF THE PERITONEAL DIALYSIS SYSTEM

Parts of the Peritoneal Dialysis System

The main parts of the peritoneal dialysis system are:

1. You -- the patient.
2. Your peritoneal membrane -- a thin lining in your abdomen where the actual dialysis takes place.
3. Your peritoneal access device -- the permanent peritoneal catheter; a hollow, flexible tube.
4. The dialysate (dialysis fluid) -- in glass bottles or plastic bags.
5. The dialysis tubing -- various tubing sets used to instill the dialysate and to drain out the used solution.
6. Other equipment:
    - There may be none, as none is needed for CAPD (Continuous Ambulatory Peritoneal Dialysis).
    - There may be an automatic cycling machine. There are several types available.

You -- The Patient

You are the most important part of the whole dialysis system. You are a human being, with your unique reactions to the process of dialysis.

Your Peritoneal Membrane

The peritoneum is a porous, delicate layer of cells plentiful in blood vessels. This sac lines the abdominal cavity and covers most of the internal organs (i.e., stomach, liver, intestines, etc.). It acts as the dialyzing membrane, permitting wastes from your body to cross it and empty into the instilled dialysis fluid.

Your Peritoneal Access Device

A flexible hollow tube called a catheter is inserted into the abdomen, usually by a minor operative procedure. The catheter is usually positioned just below your umbilicus (belly-button) and extends through the wall of the peritoneum.

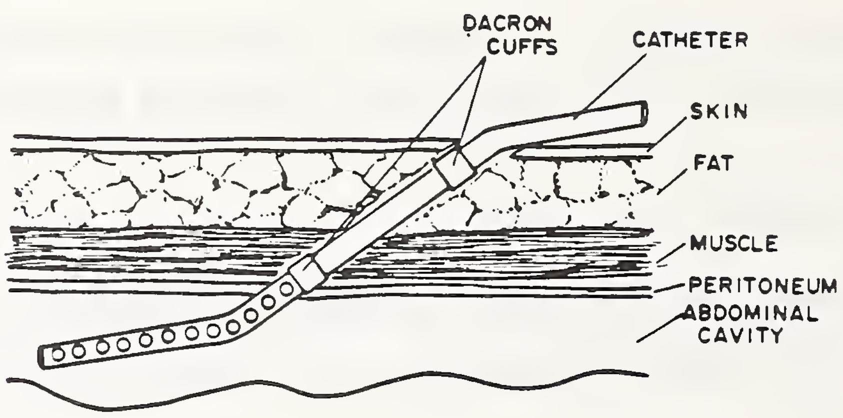


Figure 1

SOURCE: Dialysis Manual. Veterans Administration Hospital, Nashville, Tennessee, 1979.

The Dialysate (Dialysis Fluid)

The dialysis fluid or dialysate is instilled into the peritoneal cavity for a time period prescribed by your doctor. During this time period (called dwell time) the waste products of your body move across the membrane. This solution is then drained and fresh solution is instilled. This cycle is repeated several times a day.

The words "dialysis fluid" and "dialysate" are used interchangeably in this training manual. They are the same thing. In peritoneal dialysis, the dialysate is a sterile (free from germs) solution.

The Dialysis Tubing

The dialysis tubing is used to instill and drain the dialysate. Depending on the type of peritoneal dialysis, there may be one or two sets of tubing.

Other Equipment

You may or may not need any other equipment. For CAPD (Continuous Ambulatory Peritoneal Dialysis) you may only need the dialysate, the catheter and the connecting tubing.

For other methods of peritoneal dialysis, there are several types of automated cycling machines available. Some need electricity and water and are able to mix a dialysis solution suited

to your needs. Others need only electricity and use gravity to drain. Your doctor will discuss the options with you so you can help determine which is best for you.

Your Peritoneal Dialysis Set-Up

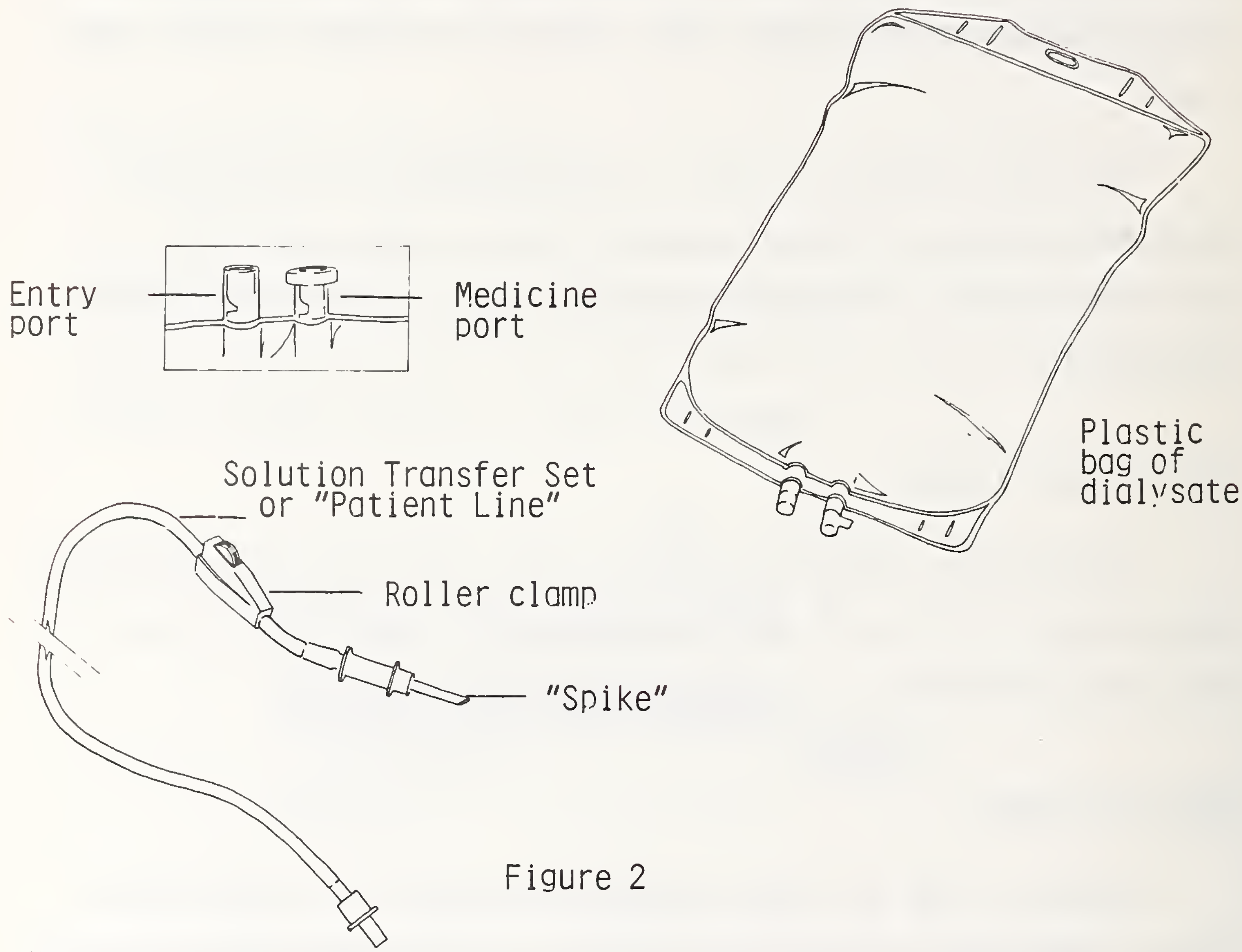


Figure 2

Note:

Label the names of the dialysis equipment parts in the above drawing with the words you use on your unit. It is important that all patients and all dialysis unit staff from your unit use the same words to describe the parts of the equipment.

Types of Peritoneal Dialysis

As mentioned before, there are several types of peritoneal dialysis. The main differences involve:

1. Which type of equipment is available to you, and
2. What your prescribed time schedule is.

Examples of the differences are:

1. IPD: Intermittent Peritoneal Dialysis usually refers to peritoneal dialysis scheduled on an every other day schedule for a 6 to 12 hour procedure. There are usually certain times prescribed for the inflow, dwell, and outflow. This type of dialysis can be done by:

   a. Automatic cycling machine which needs both water and electricity to mix the dialysate.

   b. Automatic cycling machine which only needs electricity and drains by gravity.

   c. Individual bottles or bags of dialysate which are hung and changed by hand.

2. CAPD: Continuous Ambulatory Peritoneal Dialysis usually refers to a continuous (24 hour, 7 days a week) dialysis procedure. There are dialysate bag changes 3 to 5 times a day. By using plastic bags for this type dialysis, you can fold them up, tuck them into your clothing and go about your usual daily activities.

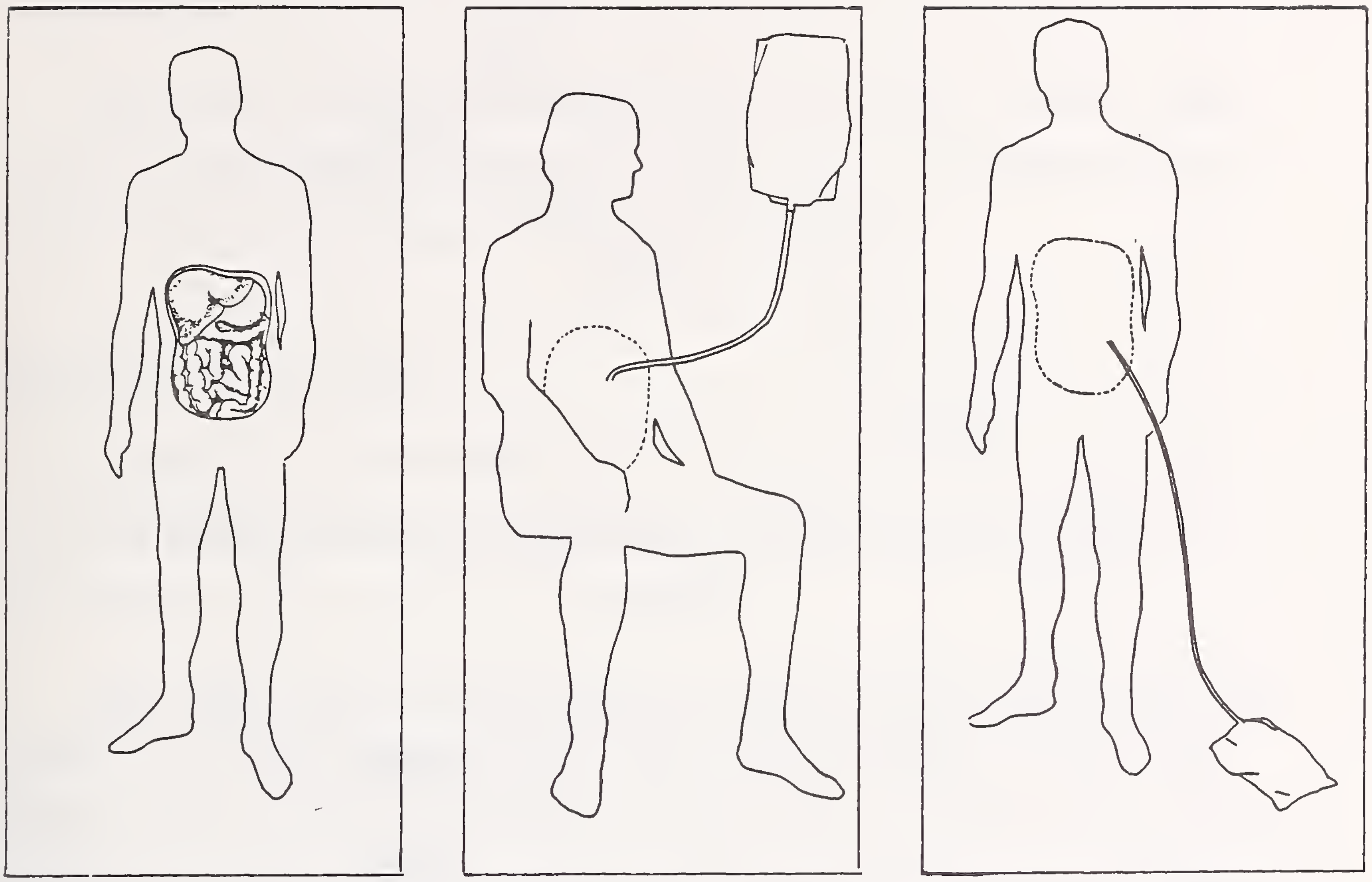
There are even variations possible in combining the above. Some new terms being used are:

- PDPD: Prolonged Dwell Peritoneal Dialysis.
- CCPD: Continuous Cycler Peritoneal Dialysis.

Both of these terms mean that there is a longer dwell time prescribed for the dialysate to sit in the peritoneum. Automatic cycling equipment is used to fill and drain the peritoneum.

As with all medical procedures, there will undoubtedly be further changes and refinements in the future. Your dialysis unit staff will keep you informed of these.

Continuous Ambulatory Peritoneal Dialysis



Section of abdomen covered by peritoneal membrane

Dialysis fluid draining into peritoneal cavity

Dialysis fluid draining out. No machine is required with CAPD

Figure 3

Intermittent Peritoneal Dialysis with Automatic Cycling Equipment

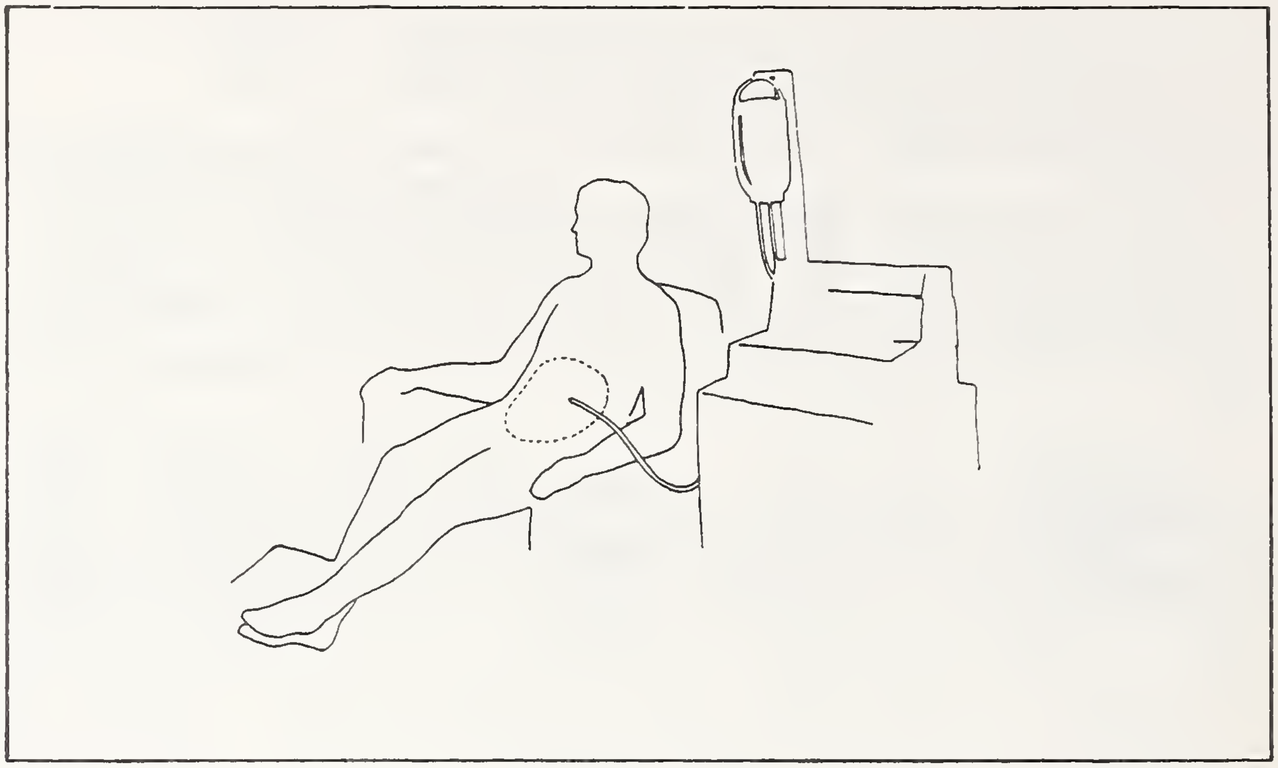


Figure 4

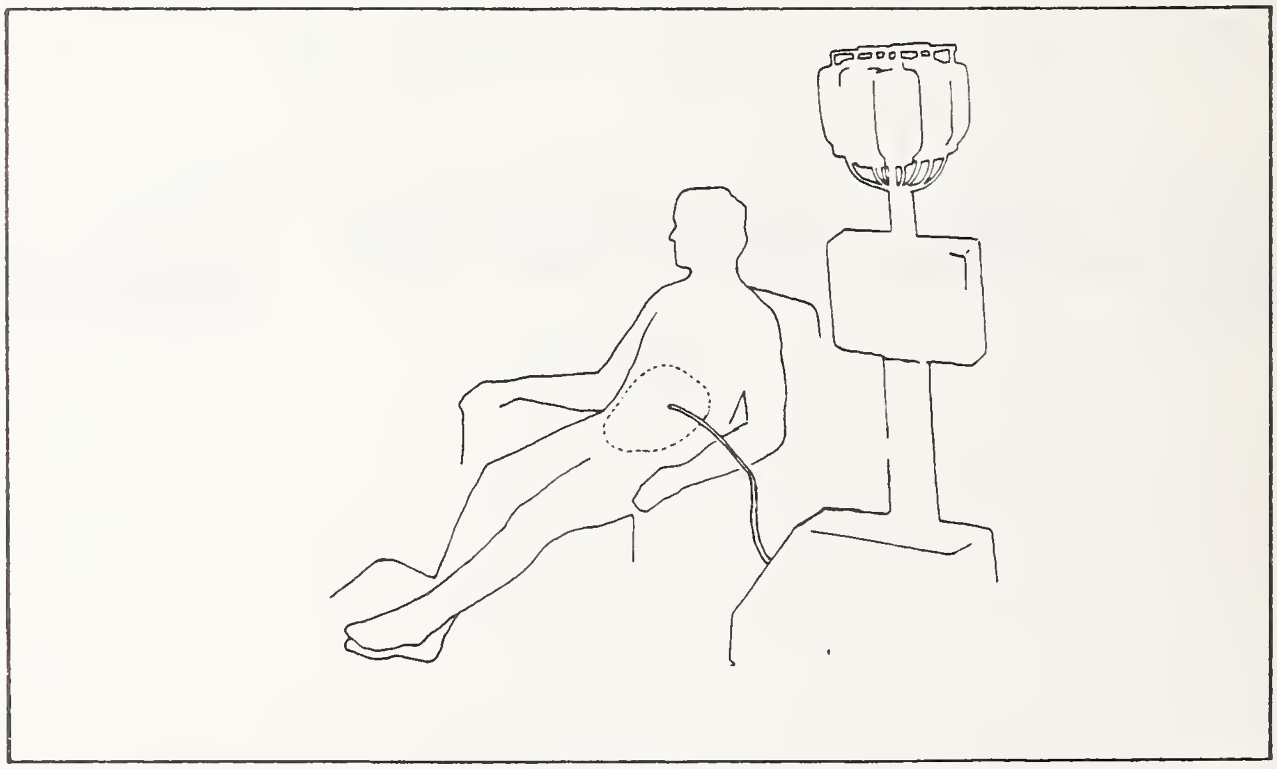


Figure 5

UNIT 2 -- HOW PERITONEAL DIALYSIS WORKS

Introduction

Peritoneal dialysis removes fluid and wastes from the body using the peritoneal membrane to do the work. Listed below are some of the terms used to describe what happens.

Dialysis and Diffusion

Dialysis is the movement of fluid and particles from one place to another across a membrane. Another word for this is diffusion.

Diffusion occurs when the particles move from the side where there are a great many of them (very concentrated) to the side where there are less (not very concentrated). This process occurs between the dialysate fluid on one side of the peritoneal membrane and the rich blood supply of the abdominal organs (stomach, intestines, etc.) on the other side.

The dialysate fluid and blood do not mix. Instead, very small particles called molecules and electrolytes cross the cell membranes from the blood side to the dialysate side.

Filtration and Ultrafiltration

Filtration refers to the process of separating one thing from another as with a common filter. Whereas, dialysis and diffusion refer to the movement of particles across the peritoneal membrane, filtration here refers to the movement of water across the membrane. Another very common term to refer to this movement of water is osmosis.

Ultrafiltration refers to a process where either additional pressures or higher concentrations of solutions are added to increase the filtration rate. In peritoneal dialysis this occurs by adding more dextrose to the dialysate, to force a greater removal of fluid from the cells. This process is necessary when you want to remove excess fluid from your body.

You and your doctor will determine a body weight at which you feel that you have no excess fluid "on board." This is known as your dry weight. A high weight gain above your dry weight can result in either problems with your heart and/or your lungs. You should notify your doctor if you are unable to remove the weight gains between dialysis.

Ultrafiltration in IPD and CAPD

To remove excess fluid while on IPD you will be instructed to use dialysate with dextrose concentration of 50% instead of the usual 30%. If you are on CAPD, you will be instructed to use the dialysate with dextrose concentration of 4.25% instead of 1.5%.

You will receive specific instructions from your dialysis unit staff on how and when to adjust the dextrose concentration.

NOTE: Additional dextrose in the solution can be absorbed and can result in abnormally high blood sugars. If you have diabetes, close monitoring of blood levels is essential and may require additional insulin added to the bag or bottle.

UNIT 3 -- CARE OF YOUR PERITONEAL ACCESS SITE

The Peritoneal Access

Access to the peritoneal space is obtained by inserting a permanent peritoneal catheter into the abdomen by a minor surgical procedure. This hollow, flexible tubing is placed just below the umbilicus (belly-button) and tunnels through a layer of fatty tissue and muscle until it reaches the open cavity.

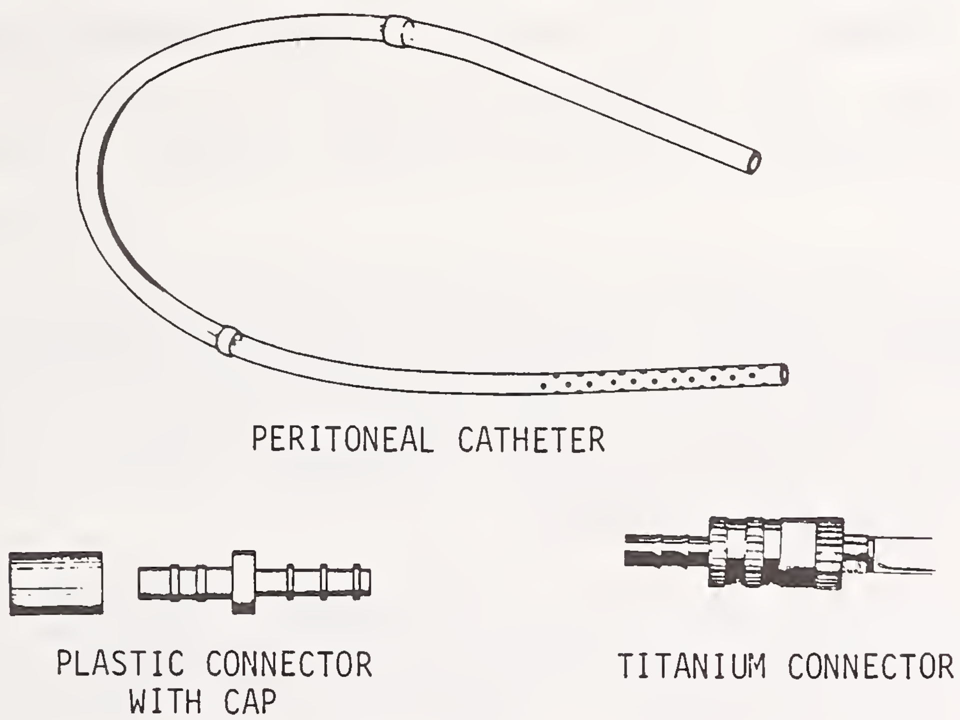


Figure 6

A portion of the catheter (approximately 3 inches) remains on the abdomen allowing for the easy connection/disconnection to the dialysis lines or solution tubing. The catheter is designed with one or two dacron or felt cuffs. When there are two cuffs, one cuff rests on the peritoneal membrane; the other is positioned just beneath the skin. A few weeks after insertion, tissue grows into these cuffs securing them in place.

The exit site is an extremely vulnerable area for infection. Thus, strict cleanliness is a must if the catheter is to survive long-term.

Routine Care

Routine care of the catheter consists of daily cleansing of the catheter, exit site, and surrounding skin area with an antiseptic solution. Your dialysis unit may treat the routine care as either a sterile procedure or a clean procedure. The sample procedure included in this manual outlines a sterile catheter and exit site care. This procedure can easily be adapted to a clean procedure.

The exit site and any dressing should be kept dry at all times. Moisture causes irritation and possible infection. In summer months or during periods of excess sweating, frequent changes of dressing are a must.

Clothing around the catheter should be comfortable and non-irritating (not too tight!). Avoid carrying heavy objects on your tummy/abdomen.

Once the site is completely healed and free of irritation or infection, showers are permitted and preferable to baths. Your doctor will advise you on this. It is important to leave slack in the tubing while you shower, so that it will not become too taut and be pulled out accidentally. If you have questions about swimming, your doctor will advise you on this also.

Catheter and Exit Site Examination

You should examine your catheter and exit site regularly for signs of infection. This examination includes:

Inspection (looking):

1. Does the exit site appear red?
2. Is there any unusual swelling or bulging at the exit site?
3. Is there any bleeding or discharge at the exit site?

Palpation (feeling):

The catheter segment and cuff should be felt for proper position regularly.

1. Is any pain noted when the cuff is gently squeezed?
2. Is any discharge present after such action?
3. Are there any kinks noted or disturbing lumps?

Catheter and exit site complications are infrequent and can be successfully managed by early diagnosis and treatment. If, however, any infection is suspected, a culture should be taken from the suspect area. Notify your dialysis unit staff as soon as you are the slightest bit concerned that you might have an infection.

UNIT 4 -- THE IMPORTANCE OF STERILE TECHNIQUE

Introduction

The peritoneum must be kept free from germs. If germs are introduced into the peritoneum, you will usually get an infection. Even though there are antibiotics to treat such infections, it is better to work toward preventing any infection at all. In order to do this, it is important for you to learn how to practice sterile technique.

Sterile means to be completely free of all germs. (Other terms used for germs are bacteria and micro-organisms.) Sterile technique is a series of procedures that must be followed exactly in order not to introduce any germs into the peritoneal dialysis system.

Sterile technique must be used when you drain the used dialysate and when you infuse the new dialysate. Catheter exit site care is practiced as either a sterile or clean procedure. Your dialysis unit staff will instruct you on what is appropriate for you.

To assist you in learning about sterile technique your dialysis unit staff will also teach you about the following:

1. Common words used when discussing sterile technique.
2. How to wash (and scrub) your hands.
3. How to put on sterile gloves (if your unit uses them).

4. How to set up a sterile field.

5. How to maintain a sterile closed dialysis system.

Adherence to sterile procedures prevents infection and is the major factor to successful long-term dialysis.

The Idea of Sterility

Everything that comes into contact with your peritoneum during dialysis must be sterile or completely free of all germs (also called bacteria or micro-organisms). One difficulty in understanding the idea of germs or micro-organisms is that they cannot be seen with the naked eye. You can only see them with a microscope which is a special instrument used to enlarge or magnify very small items.

Another difficulty in understanding about micro-organisms is that there are both "good" and "bad" micro-organisms. The fact is, that most micro-organisms found on the body are not harmful and try to protect it from invasion. There are only a few of the non-protective or "bad" micro-organisms. These can usually be removed easily on unbroken skin.

Unfortunately, both types can cause disease and infection when they get into a part of the body such as the blood stream or the peritoneal space. All it takes is one organism to enter the system, multiply, and then spread until an infection results.

Four common terms used when discussing sterility are:

Sterile -- completely free of all germs (bacteria or micro-organisms).

Clean -- not completely free of germs, but disinfected so it is usable for certain steps in the dialysis procedure.

Contaminated -- a sterile item has touched or been touched by something that is not sterile; the item is now considered unsterile. (Germs from the unsterile item "transfer" to sterile item.)

Dirty -- similar to contaminated, but contains a lot of germs. Item is neither clean nor sterile. Cannot be used for dialysis procedures where either clean or sterile is necessary.

Eliminating Germs

Since germs are present everywhere, special precaution must be taken to eliminate them. Two methods are:

- Disinfection,
- Sterilization.

Disinfection reduces the number of organisms, but does not destroy them all. Betadine® is a commonly used disinfectant. It has the ability to destroy the most harmful germs but does not eliminate them all. Sterilization is a process that destroys all germs. Three methods used to sterilize are heat, chemical agents such as formaldehyde, and gases.

Dialysis patients will learn how to disinfect. This involves scrubbing or soaking an item in a disinfectant solution such as Betadine® or alcohol.

Washing and Scrubbing Your Hands

Two sample procedures are given in Section 1, p. 84, regarding both washing and scrubbing your hands. Since skin cannot be sterilized you need to disinfect it as much as possible.

When you wash your hands with soap and water you can remove the obvious dirt that can be seen, all the "bad" micro-organisms, and some of the other commonly harmless micro-organisms. You must remember to dry your hands after washing with clean, dry paper towels.

When you scrub your hands with a disinfectant for a prescribed time period, you can remove the obvious dirt, all the "bad" micro-organisms, and most of the common harmless micro-organisms. Again, it is important to dry your hands after scrubbing with clean, dry paper towels.

How to Work with Sterile Supplies

Dialysis patients need to learn how to work with sterile supplies. Many of the packaged supplies will come to you already sterilized. You will learn which parts you can touch with your

bare (but clean) hands and which other parts you can only handle with sterile gloves.

There are a few rules you have to follow when you work with sterile supplies:

1. Always wear a mask, if this is your unit's procedure.

2. Wash hands thoroughly, according to your unit's procedure.

3. Keep the work area as clean and uncluttered as possible.

4. Do not cough, sneeze, or laugh over or near a sterile object.

5. Never use a packaged item when the date has expired, is wet, or has a hole in it.

6. If you have sterile gloves on, keep your hands above your waist, so you can see them.

7. If you drop anything on the floor, consider it contaminated, even if it is still wrapped.

8. If you are not sure if an item is sterile or not, consider it contaminated. Either discard it or resterilize it. ("When in doubt, throw it out.")

<u>How to Keep a Sterile Field (Area) Sterile</u>

1. A sterile field (area) is usually created by using an open sterile towel or dressing.

2. Do not leave a sterile field; keep it within your vision.

3. If you do need to leave for more than a few seconds, cover the field with another sterile towel or dressing.

4. Since air currents carry germs, do not wave sterile towels around and do not move sterile objects around.

5. When placing or dropping a sterile object on a sterile field, do not let the wrapper of the object touch the field.

6. Do not reach across a sterile field. Particles may drop from your arm, or you may accidentally touch a sterile object.

7. Since the edges of a sterile field are considered contaminated, do not place sterile items very near the edges.

8. Avoid spilling liquids on a sterile area. A <u>wet area</u> is always considered contaminated because germs can come up from the surface below by soaking through the dry material.

<u>Four Basic Rules to Remember in Maintaining a Sterile Field</u>

- Sterile + Sterile = Sterile
- Sterile + Clean = Clean
- Sterile + Dirty = Dirty
- Clean + Dirty = Dirty

<u>Sterile and Clean Equipment</u>

It is important that you learn what parts of your peritoneal dialysis equipment are clean and sterile. Listed below are examples of each.

Sterile Items

1. The dialysate solution
2. The entry port
3. The spike (the pointed end of the solution transfer set)
4. A Betadine®-soaked sterile 4" x 4"

Clean Items

1. The outside of the dialysate bag
2. The outside of the dialysate tubing
3. Clamps and Chux
4. A dry sterile 4" x 4" after being opened and touched

REMINDER: You must always keep the spike sterile. It must never bump or touch anything. It is sterile when the line is hooked up to the dialysate and must always stay sterile. If you accidently touch anything with the spike as you are doing dialysis, call the unit for instructions before proceeding with the procedure.

Peritoneal Dialysis -- Drugs and Solutions

Drugs. Four medications or drugs commonly used in the peritoneal dialysis procedures are:

- Heparin
- Insulin
- KCl (Potassium Chloride)
- Antibiotics

Heparin is a medication that is used to prevent the formation of fibrin in the catheter. Your dialysis unit staff will instruct you on the amount of heparin you may need to inject into the peritoneal dialysis fluid bottle or bag.

Heparin is packaged in 10 ml. or 30 ml. bottles. Whenever you receive a new supply of heparin, check the unit dose on the label. The most frequently prepared heparin is that containing 1000 units per ml. Label your syringe with an "H" when you have your dose drawn up with tape or a felt-tip pen.

Insulin is a protein hormone which increases the cell's absorption of glucose. If you are a diabetic it may be ordered to be added to the dialysate. Insulin is packaged in 10 ml. vials.

KCl (Potassium Chloride) is an electrolyte solution added to the dialysate to prevent excess potassium loss. KCl is packaged in a number of liquid measured quantities.

Antibiotics are medications given to fight infection.

Solutions

Dialysis fluid. The peritoneal dialysis fluid is called the dialysate. The fluid enters your peritoneal cavity via your peritoneal catheter. At the present time, the solution is available in either glass bottles or plastic bags, in amounts of 500 cc, 1000 cc, or 2000 cc.

CHECK YOURSELF

Directions: Answer "Yes" or "No" to the following situations. Discuss the answers with your dialysis unit staff if you are unsure of the answers.

1. When you read the label on the bottle of heparin you see the expiration date is August 1979. Would you prepare the solution?

   Yes ______ No ______

2. As you begin to prepare the heparin solution, you forget to wipe the top of the bottle with alcohol, and put the needle through the rubber top. Should you continue with the procedure?

   Yes ______ No ______

3. In removing the medication from the bottle you touch the bedside stand with the needle. Is the needle contaminated?

   Yes ______ No ______

4. When beginning to open the syringe from its sterile package you drop the package on the floor. Would you use this syringe?

   Yes ______ No ______

5. When preparing your sterile field, you do not have a face mask on, and you sneeze as you are opening the sterile 4" x 4"'s. Is the field sterile?

   Yes ______ No ______

ANSWERS

1. No
2. No
3. Yes
4. No
5. No

CHAPTER 6 -- PROBLEMS WITH PERITONEAL DIALYSIS

INTRODUCTION

A. When To Call The Unit -- Peritoneal Dialysis Problems

Notify Dialysis Unit Staff of the Following Problems Related To Peritoneal Dialysis Treatment

1. Cloudy dialysis fluid
2. Tenderness, redness, or drainage around catheter exit site
3. Problems with equipment
4. Abdominal pain
5. Difficulty draining
6. Break in technique or separation of dialysis tubing

Call these numbers to notify dialysis staff:

____

____

____

B. When to Call the Unit -- General Problems

Call The Dialysis Unit Staff If You Have Any of the Following Problems

1. Severe pain anywhere.

2. Elevated temperature--100^{o}F. or higher (or 99^{o}F. steadily for a long time). Use 38^{o}C. if you have a centigrade thermometer.

3. Excessive bleeding--black tarry stools, coffee-ground vomit, easy bruising of skin, catheter site bleeding.

4. Irregular heart beats--skipping beats, or over 120 or under 60 beats per minutes.

5. A skin reaction such as rash or hives which you suspect might come from drugs you are taking.

6. Constant headaches.

7. Nonspecific symptoms--diarrhea, nausea and vomiting, dizziness, shortness of breath or tightness in chest, extreme fatigue or weakness.

8. If you have an accident (car, fall, etc.).

Your dialysis staff will give you further instructions about what to do. Phone numbers:

____

____

____

UNIT 1 -- PROBLEMS RELATED TO YOURSELF

Medical Problems

Since the kidneys influence the effects of several of the other body systems, you have other medical problems besides a decrease in the amount of urine you make when you have kidney disease.

The common problems are listed below and discussed briefly. It is important that you be aware of these so that you can report symptoms (your feelings) before serious complications set in.

- Cardiac or heart problems
  - High blood pressure or hypertension
  - High potassium levels or hyperkalemia
  - Pericarditis or inflammation of the sac around the heart
- Anemia or low red blood cell count
- Bone Disease
- Nerve damage or neuropathy in hands and feet
- Skin problems such as itching and darkening color

Serum hepatitis is a special problem for people on dialysis. It is described separately in this unit, on p. 249.

1. Cardiac or Heart Problems

a. High Blood Pressure or Hypertension

There are two main reasons for high blood pressure in the dialysis patient. One theory is that the damaged kidneys produce too much renin (a hormone) which makes the blood pressure go up. Another is that the damaged kidneys cannot control the amount of sodium (salt) and fluid in the body. Holding on to salt and fluid causes problems such as swelling of hands and feet (edema). Coughing and difficulty in breathing may indicate that fluid is collecting in your lungs. As the fluid continues to collect in your body, and as the blood pressure starts to climb, you may have a greater chance for a heart attack or a stroke. Your weight will go up as fluid accumulates in your body. During the dialysis procedure you will have to use higher pressures to remove the excess fluid.

b. High Potassium Levels or Hyperkalemia

The normal potassium level is 3.5 to 5.5 mEq. When higher, it is dangerous because it can cause serious disturbances in the regularity of the heart beat as well as stopping the heart bests altogether.

Symptoms of hyperkalemia include muscle weakness, making it hard to walk, holding your head up or holding on to things. Report these symptoms to the dialysis nurse or doctor.

Healthy kidneys are able to filter the excess potassium out. Since your damaged kidneys are not able to do it, you must be careful about your choice of foods and avoid any foods that are especially high in potassium.

c. Pericarditis (Inflammation of the Sac Around the Heart)

Pericarditis can be caused by viruses or bacteria (germs) in patients who are very ill with uremia. Symptoms of pericarditis may be a constant pain in the center of the chest which is relieved by sitting up and taking deep breaths.

2. Anemia (Low Red Blood Cell Count)

Most patients on dialysis are anemic -- that is, their red blood cell count is around 20 percent. Most people with normal kidney function have 40 to 45 percent red blood cells in their blood stream. (The test to check the red blood cell count is called the Hematocrit, or sometimes "crit" for short.) Some persons with polycystic kidney disease do not, however, have this problem.

Anemia occurs in the patient with chronic renal failure because the waste products that accumulate in the blood stream cause a depression in the activity of the bone marrow where the red cells are made. Fewer red cells are made and the ones that are made have a shorter life span.

Symptoms of anemia include increased tiredness, increased irritability or crabbiness, shortness of breath, chest pain, dizziness, irregular heart beats (arrhythmias), and sometimes chronic hypotension (low blood pressure). Most of the time, the anemia found in kidney failure is not bad enough to cause these symptoms, but if you do notice them, notify your dialysis unit staff.

Anemia can be treated by adding certain vitamins and iron supplements to your dietary intake. Testosterone, a male hormone, or other similar medication, may be given by injections (shots) since it stimulates the body to produce more red blood cells and helps build muscle mass.

Because aspirin affects the blood clotting mechanism of your body and leads to more bleeding which may aggravate the anemia, <u>it is recommended that you check with your doctor before you take any aspirin</u> or any drugs containing aspirin (such as Bufferin®, Anacin®, or Alka-Seltzer®).

Blood transfusions are usually avoided as treatment of anemia for renal patients. Your doctor will advise you about this.

3. <u>Bone Disease</u>

Calcium and phosphorus are two minerals that are necessary to build strong bones. The "see-saw" relationship of the calcium and

phosphorus balance is described more fully with the dietary information (Chapter 2). With kidney disease, an imbalance occurs that makes kidney patients very susceptible to fractures and broken bones. Even the stress of coughing or sneezing may cause fractures.

The process of destroying the bone is a very long, slow process and you may not be aware of any immediate problem. A blood test measuring the level of the parathyroid hormone may be done routinely and the problem may be noted. Signs and symptoms include:

- Bone pain, in the arms and legs or the ribs or spine
- Unexpected fractures, such as a rib fracture after coughing or sneezing
- Headaches because of a high calcium level
- Nausea and vomiting
- Loss of appetite
- Depression
- Constipation
- Itching (many patients with renal disease have some degree of itching, without bone disease)

4. Nerve Damage or Neuropathy

Neuropathy or nerve damage is thought to be related to the accumulation of waste products in the body. These wastes may damage the nerves directly or they may interfere with the ability of certain vitamins and nutrients, which you take in as food, to reach the nerves.

The symptoms of nerve damage are numbness and tingling of the feet (especially the balls of the feet), burning feeling in the toes and soles of the feet, weakness of the feet and legs, with difficulty in walking. If you develop any of the above symptoms, notify the dialysis doctor or nurse. The doctor may order nerve conduction studies to determine the amount of nerve damage.

The treatment and prevention of neuropathy are adequate dialysis time, as well as an adequate diet with some vitamin supplements. If you have neuropathy, your dialysis time may be increased and tests will be completed so treatment can be effective before the damage is permanent.

5. Skin Problems (Itching and Darkening Color)

Almost all patients with renal failure have dry, scaly skin with some degree of itching. It is fairly common when dialysis is first started, but should lessen after you have been on dialysis for several weeks.

Treatment may be longer dialysis sessions. Bath oils and lanolin skin preparations are sometimes soothing. If the itching is due to a drug reaction, however, your doctor may prescribe an antihistamine to relieve the itching.

A change in the color of the skin may develop in patients with renal failure because the pigments (color particles) that are normally eliminated by the kidneys cannot be discharged when the kidneys are damaged. This change in skin color may also be due to the anemia. It is a cosmetic problem, and is not dangerous.

6. Peritonitis

Peritonitis is an infection of the peritoneum, of special concern to the patients on peritoneal dialysis. Full discussion of this problem is in Unit 3, p. 257.

CHECK YOURSELF

Directions: Complete the following questions. If you are not sure of the answers, go back and read the material again.

1. The hypertension (high blood pressure) of the dialysis patient is due to:

   a. ______________________________

   b. ______________________________

2. The normal potassium level is ________ to ________ mEq. High levels are dangerous because they cause __________
____

3. The main symptom of pericarditis (inflammation of the sac around the heart) may be ______________________________
____

4. Symptoms of anemia are (name at least five):

____

____

____

____

____

5. Bone disease is characterized by a "see-saw" relationship of the ________________ and ________________ balance.

6. The symptoms of nerve damage (or neuropathy) are ______ ________________ and ______ ______________ of the feet.

7. Treatment for the itching that accompanies renal failure may be ____________________ dialysis sessions, or sometimes lanolin ____________________ _________________________ are helpful.

ANSWERS

1. Production of too much renin (or hormone), kidneys unable to control the amount of salt and water in the body.

2. 3.5 to 5.5 mEq., irregularities in the heart beat.

3. Constant pain in the center of the chest.

4. Any five: increased tiredness, increased irritability or crabbiness, shortness of breath, chest pain, dizziness, irregular heart beats, chronic hypotension.

5. Calcium, phosphorus.

6. Numbness, tingling.

7. Longer, skin preparations.

Hepatitis

Hepatitis is an infectious, contagious disease caused by a virus that damages the liver. It is most important that people on dialysis as well as their families know about this condition. This is especially true for patients on hemodialysis.

The types of hepatitis are:

- Infectious, or Type A, hepatitis
- Serum, or Type B, hepatitis
- Non-A, Non-B hepatitis

Infectious hepatitis, Type A, is usually transmitted by close contact with other people who are carriers of the virus through contaminated food, water or body secretions.

Serum hepatitis, Type B, is usually transmitted by contaminated blood, being stuck with a used needle, or getting contaminated blood on a cut or on bruised skin where it could easily enter the blood stream. All dialysis patients need to take special precautions to avoid contacting serum hepatitis.

Non-A, Non-B hepatitis is a condition that cannot be identified as either Type A or Type B hepatitis. All dialysis patients need to also be wary of this, but especially the hemodialysis patients.

Symptoms to Report

- Slowly increasing tiredness
- Loss of appetite

- Nausea, vomiting
- Yellowing of the skin and eyes
- Joint pain and muscle aches
- Brown colored urine
- Clay colored stools (bowel movements)
- Itching skin
- Dull pain in right upper abdomen

How to Tell If You Have Hepatitis

Hepatitis is usually diagnosed in the early stages from the routine monthly blood tests. The following suggests the presence of hepatitis virus in the blood:

- Rise in bilirubin level
- Rise in liver enzymes
- Appearance of hepatitis B surface antigen (HB_SAg)
- Appearance of hepatitis B core structure (HB_CAg)

There may be special dialysis stations set aside for "positive" patients at your dialysis unit. The serious implications of carrying the hepatitis virus are especially important if you wish to travel. Some dialysis units do not permit positive patients to use their units, since the virus is so easily spread.

The Treatment for Hepatitis

The treatment usually consists of bed rest and adequate diet. This seems to be the only therapy that appears to help at present. The management of the diet is extremely important. If loss of appetite and/or nausea and vomiting are severe, you may need to be hospitalized. You may get over the acute stage of the disease rather quickly but then it is possible to remain a chronic carrier of the virus.

Precautions to Take to Protect Your Family

It is difficult, and inadvisable, to maintain a total state of separateness from your family if you are carrying the hepatitis virus. Listed below are some precautions you must follow. Your dialysis staff may advise you on others.

When you are at home:

- Keep your hands clean by washing frequently.
- It is advisable for you to have a separate razor, comb, and nail cutter from the rest of the family.
- If you have guests coming into your home, and if you have two bathrooms, advise the guests to use the one for guests.

When you are away from your home:

- If you need to use a public bathroom facility when you are out, it is advisable that you dispose of your towels and tissues carefully.
- If you are with others who will come in contact with your blood (barbers, dentists, hospital labs, etc.) inform them that you are carrying the hepatitis virus.

When you are on dialysis:

- Avoid eating and smoking on dialysis if you are on self-dialysis in a dialysis unit.

(For Hemodialysis Patients)

- Wear gloves as instructed. Artificial kidneys, needles, syringes, and blood lines should be disposed of as instructed by your dialysis unit staff.

CHECK YOURSELF

Directions: Cover the answers below. When finished completing the exercise, if your answers do not compare with the answers given, go back and read the material again.

1. List the types of hepatitis:

   a. ____________________ c. ____________________

   b. ____________________

2. Hemodialysis patients need to be wary of ______________ ____________________ because of the frequent exposure to blood in dialysis units.

3. Hepatitis is usually diagnosed in the early stages from routine ______________ ____________________.

4. Describe what your dialysis staff has advised you regarding hepatitis precautions in your own home:

   ____

   ____

   ____

ANSWERS

1. Infectious hepatitis, serum hepatitis, Non-A, Non-B hepatitis
2. Serum hepatitis
3. Blood tests
4. Your own answer

UNIT 2 -- PROBLEMS RELATED TO YOUR PERITONEAL ACCESS

Catheter Exit Infections

Exit infections can be easily detected by routine self-examination. Drainage, redness, swelling and pain are early signs of infection. In most instances, antibiotic therapy is started after a culture has been taken. The earlier the infection is detected, the better are the chances of control of infection.

Catheter Malfunctions

This is generally seen when the catheter fails to drain, causing a retention of fluid. The causes vary from simple kinking of the tube, to malposition, internal obstruction of catheter tip with fibrin tissue, air locks (air lodged in the tubing), or constipation. Frequently, changing positions will improve drainage. The catheter tip floats free and can easily become lodged in internal layers of tissue (omentum). At times, bowel stimulation via a laxative or enema will move the catheter position and improve drainage even if you have not been constipated.

Pain/Abdominal Discomfort

Dialysis with an implanted catheter is a painless procedure. Thus, any pain related to the procedure should be reported and evaluated, especially abdominal pain or shoulder pain.

Some possible causes:

1. Dialysis fluid irritating the peritoneum
2. Catheter displacement
3. Fluid retention
4. Free abdominal air
5. Acid-base imbalance (pH imbalance)
6. Peritonitis

Leakage

Leakage may occur early after catheter insertion when tissue growth into the cuff has not occurred. Occasionally, small volumes of dialysis fluid are used to prevent leakage due to overdistention.

Adequate Drainage

It is extremely important to maintain the peritoneal drainage system. The peritoneal catheter must be positioned correctly, must be clear of fibrin, and the entire peritoneum and catheter exit site and catheter tunnel area must be free of infection.

After osmosis and diffusion have taken place across the peritoneal membrane, the dialysis fluid must have a clear route to drain. In your training program you will learn troubleshooting techniques to use if you run into problems with drainage.

UNIT 3 -- PERITONITIS

Introduction

The complication of most concern in peritoneal dialysis is infection of the peritoneum or peritonitis. Besides general pain and illness, this condition results in excessive loss of protein.

Infection can occur from contamination of a sterile field or from airborne bacteria. You are most susceptible to infection the first few weeks after catheter insertion. If your doctor has instructed you to wear masks and gloves during the exchange procedures, it is important that you follow the instructions.

Prevention of Peritonitis Depends on Three Major Points

1. Being able to carry out absolute sterile technique
2. Being alert to potential problems or possible areas of contamination
3. Quick reporting to dialysis unit staff if a problem is noted.

Strict adherence to sterile technique is the key to success; it can prevent this most critical problem.

Symptoms of Peritonitis:

1. Most often cloudy dialysate return
2. Pain in the abdominal area
3. Low grade fever
4. Redness/tenderness of the abdomen
5. Some loss of appetite
6. Catheter obstruction

Treatment

1. Most often you will be instructed to instill antibiotics into the dialysis fluid and give the exchanges rapidly until the drainage appears clear.

2. Before any treatment is started, you will get a culture to identify the organism causing the infection.

3. You may also be started on oral antibiotics.

4. To avoid relapse, you will probably be kept on antibiotics for about 3 weeks from the start of treatment.

Pointers for Protection Against Peritonitis

1. Work in a good light
2. Wear masks (if this is your unit's procedure)
3. Do not rush
4. Do not take shortcuts
5. Always wash hands according to procedures
6. Keep work area clean and uncluttered
7. Do not allow distractions--children, TV, pets, noise--when doing sterile procedures
8. Follow procedures exactly.

UNIT 4 -- TROUBLESHOOTING CHART (PERITONEAL)

Introduction

The following pages need to be completed by the staff of your dialysis unit. They will fill in what their recommended treatment is for you in the various situations.

The Troubleshooting Chart has been placed here until you have learned the easier things first. After you have learned all the other material, you may want to move the Troubleshooting Chart to the front of the manual.

UNIT 4 -- TROUBLESHOOTING CHART (PERITONEAL DIALYSIS)

PROBLEM	SIGNS AND SYMPTOMS
A. Poor drainage from abdomen	Drainage bag does not fill; feeling of fullness.
TREATMENT:	
	Constipation may be interferring with drainage.
TREATMENT:	
B. Pain	Abdominal
TREATMENT:	
	Shoulder
TREATMENT:	
	Headache
TREATMENT:	
C. Leakage of fluid around catheter exit site	Wet dressing from fluid; due to poor abdominal muscle tone, obesity, fluid retention, coughing, sneezing, overactivity.
TREATMENT:	

PROBLEM	SIGNS AND SYMPTOMS
D. Blood stained drainage	Dressings and/or drainage may be red-tinged.
TREATMENT:	
E. Inadequate dialysis	Signs noted of increasing uremia: (1) weakness (2) nausea and vomiting (3) tremors (4) itching
TREATMENT:	
F. Defective equipment (noted in middle of procedure)	Broken, cracked, unsterile, etc.
TREATMENT:	
G. Accidental disconnections	Catheter and tubing separated; fluid draining freely.
TREATMENT:	

section three

sample technical procedures

HEMODIALYSIS PROCEDURES

TABLE OF CONTENTS

INSTRUCTIONS TO PATIENTS

The sample procedures in this self-dialysis training manual are written in three columns so the training may be documented as you learn the procedures.

As discussed previously, the sample procedures are intended to be a guide to the dialysis unit staff to use as teaching tools for self-dialysis training. Substitutions for local terminology or local custom may need to be inserted.

THREE COLUMN APPROACH

Essential Steps -- The steps listed in this column are the steps necessary to perform the particular dialysis procedure in a safe and efficient manner.

Explanation -- The information given in this column offers some of the reasons a particular step must be done the way it is suggested.

Practice Checklist -- There are five spaces to check off five practice sessions of each of the essential steps. The trainer should use this column to check off the number of times they observe you practicing a particular step before you are proficient in it. The trainer may add more lines to make additional spaces if you need more practice. When you are proficient in a particular task, the trainer writes his/her initials and the date in the space following the last check mark. This means the trainer has judged you competent in this area.

HEMODIALYSIS FLOW SHEET

NAME ____________________

DATE ____________________

PRE-TREATMENT ASSESSMENT	DIALYZER	POST-TREATMENT ASSESSMENT
PRE-WEIGHT	DIALYSIS FLUID	POST-WEIGHT
IDEAL WEIGHT	HOURS	IDEAL WEIGHT
WEIGHT TO LOSE	PERSONAL UF FACTOR	WEIGHT LOST
B/P STAND. SIT.	LAB WORK PROFILE K+	B/P STAND. SIT.
T - P - R -	BUN/CREAT. HCT OTHER	T - P - R -
PATIENT STATUS/PROBLEMS	TX MEDICATIONS	PATIENT STATUS

QUESTIONS FOR PHYSICIAN/STAFF	TIME	B/P	P	ART PR	VEN PR	DIAL PR	HEP-ARIN	N/S	TREATMENT OBSERVATIONS
ALARMS/SENSORS									
CONDUCTIVITY READING									
TEMPERATURE READING									
AIR DETECTOR FUNCTIONING									
BLOOD LEAK DETECTOR SETTING									
ART. PRESSURE SENSORS HI / LOW									
VEN. PRESSURE SENSORS HI / LOW									
DIALYSIS FLUID PRESSURE SENSORS HI / LOW									
(SIGNATURE OF CARE PERSON)									

HEMODIALYSIS ORDER SHEET

Introduction

The following sample of a hemodialysis order sheet is intended to incorporate the features necessary for most types of hemodialysis treatment. It is important that this plan be as flexible as your needs require while serving as a guideline for your care. How you are feeling will determine what changes are made and how often the plan will be evaluated.

NAME ____________________

DATE ____________________

HEMODIALYSIS ORDER SHEET

PRIMARY PHYSICIAN: ____________________ DIAGNOSIS: ____________________

FREQUENCY AND SCHEDULE OF TREATMENT: ____________________

TYPE OF DIALYZER: ____________________ TYPE OF MACHINE: ____________________

LENGTH OF TREATMENT: ______ 3" ______ 3½" ______ 4" ______ 4½" ______ OTHER

TYPE OF DIALYSIS FLUID: ______ STD ______ mg % Calcium ______ mEq K ______ GM. Glucose

BLOOD FLOW RATE: ______ 150 ml/m ______ 200 ml/m ______ 250 ml/m ______ 300 ml/m

DIALYSIS FLUID FLOW RATE: ______ 400 ml/m ______ 500 ml/m ______ 600 ml/m ______ OTHER

IDEAL WEIGHT: ______ Kg ______ lbs.

TREATMENT MEDICATIONS:

HEPARIN: ______ INITIAL DOSE ______ HOURLY

OTHER: ____________________

HOME MEDICATIONS:

____

____

____

ALLERGIES

____

____

____

____

____

DIET:

PROTEIN: ______ Grams

POTASSIUM: ______ Grams

SODIUM: ______ Grams

FLUID: ______ Mls.

ADA: ______ Calories

OTHER: ______

LAB WORK:

TEST	DAY	/	FREQUENCY
POTASSIUM:		/	
CREATININE:		/	
BUN:		/	
ELECTROLYTES:		/	
HEMATOCRIT:		/	
HBsAG		/	
COMPLETE PROFILE:		/	

PATIENT SIGNATURE: ____________________ PHYSICIAN SIGNATURE: ____________________

DEFINITION OF TERMS

Because some of the treatment factors listed on the sample plan may not be familiar to everyone, a review follows.

Primary Physician -- Each training facility may have a number of physicians, but your primary physician is the one most directly responsible for your care.

Diagnosis -- Although you are probably aware of your particular kidney problem, when calling your treatment center, recommendations for treatment changes are often made based on your diagnosis.

Frequency and Schedule -- Your treatments should be frequent enough to replace the function of your own kidneys without requiring you to be on the machine all the time. A schedule of regularly spaced treatments is best because it eliminates wide fluctuations in the fluids and waste products in your body.

Type of Dialyzer -- Because no two people are physically the same, there is no single dialyzer which is right for everyone. Each one varies in its ability to remove wastes and fluid and in the amount of your blood required to fill it.

Type of Machine -- The type of machine you use will probably be similar to the type used in your training center. Because the staff members will be familiar with your equipment, they can answer your questions more easily. A decision as to whether you use negative or positive pressure equipment may be made based on which type you tolerate best.

Length of Treatment -- How long your treatment takes is determined by how much kidney function you still have and partly by your body size. Usually the less kidney function the longer your treatment will need to be. Some of the treatment time can be shortened by using a larger surface area dialyzer or by increasing your blood and dialysis fluid flow rates.

Type of Dialysis Fluid -- Your individual levels of electrolytes and chemistries as shown in your laboratory studies will determine what types of dialysis fluid you use. For instance, if you have problems with high potassium levels, your physician may order a low potassium bath to help bring your potassium down to a safe range.

Blood Flow Rate -- Your blood flow rate depends in part on the type of vascular access you have and on your blood pressure. While a high blood flow rate usually means better waste removal, it may also mean extra venous return to the heart. This may increase the work the heart must do. Rates of 200 ml/m - 300 ml/m are adequate for a good treatment but may be too rapid for some.

Dialysis Fluid Flow Rate -- Usually dialysis fluid flows between 400 ml/min and 600 ml/min which is sufficient for good treatment. Keep in mind that not all people tolerate rapid flow rates. Many people need a slower gentler change in their waste levels and you may be one of them.

Ideal Weight -- This term has been defined already. Generally it is the weight at which your blood pressure is as normal as possible without blood pressure medication at which you have no excess fluid in your lungs or extremities.

Treatment Medications -- This list should include all the medications which you may give to yourself while dialyzing and why they should be given.

Allergies -- You should always be aware of your allergies. It is appropriate to mention your allergies to those who are prescribing your medications.

Diet -- Your diet may vary depending on your kidney function and your body needs.

Lab Work -- This section should remind you and your treatment team of when your blood work needs to be done. If your lab results are not stable or if you require special monitoring, your blood will be tested more often.

Patient Signature -- Your signature is welcome in order to assure the treatment team of your participation in and your understanding of your treatment plan.

HEMODIALYSIS PROCEDURES

PREPARING FOR DIALYSIS

1. Dialysis Machines

The dialysis machine is prepared according to the dialysis unit's instructions. Instructions may be inserted here which describe the "set-up" procedure.

2. Pre-Dialysis Checklist for Supplies

The following supplies are needed for all types of dialyzers and access:

3 bags/bottles 1000cc Normal Saline	1 30 cc syringe
1 IV administration set	10 3 cc syringes
1 set arterial and venous blood lines	1 chux (linen protector)
6 hemostats	1 stethescope
1 box of 4" x 4" sponges	1 stopwatch
1 clotting tube rack	1 blood pressure cuff
1 roll tape	6 19 gauge needles
1 bottle Betadine® solution	2 pair rubber gloves
12 Alcohol prep pads	1 trash bag
1 small cup for Betadine®	1 bottle of Hemastix®
1 bottle heparin	1 dialysis record sheet
1 heparin pump	1 pencil or pen to keep records

3. Vascular Access Supplies

The following are additional supplies needed for each type of blood access:

A-V FISTULA

1 TB syringe with 25 gauge needle
1 bottle anesthetic, e.g., xylocaine
1 ace bandage
2 bandaids
1 tourniquet
2 fistula needles

GRAFT

1 TB syringe with 25 gauge needle
1 bottle anesthetic, e.g., xylocaine
1 ace bandage
2 bandaids
3 10cc syringes with needles
2 fistula needles
1 small bottle of saline

EXTERNAL SHUNT

1 teflon shunt connector
2 blood line connectors (if shunt lines are not used)
1 disconnect forceps
2 bulldogs or shunt clamps
1 bottle peroxide
4 cotton swabs
1 roll of Kerlix®
2 sterile 4" x 4"'s
6 clean gauze sponges

4. Checklist for Starting Dialysis

This is not a step-by-step method for starting dialysis, but rather a list to double check yourself to make sure you are ready for dialysis. If you have an external shunt, omit the items which are marked *.

_____ 1. Water supply turned on.
_____ 2. Delivery system turned on.
_____ 3. Concentrate container filled.
_____ 4. Concentrate line connected to container.
_____ 5. Dialysis fluid lines correctly connected to dialyzer.
_____ 6. Dialysis fluid flow meter registering approximately 500.
_____ 7. Dialysis fluid pressure between 0 and 50.
_____ 8. Drip chamber positioned in holder.
_____ 9. Drip chamber filled with saline.
_____ 10. Venous pressure line connected to drip chamber and line clamped with hemostat.
_____ 11. A nearly full bottle of saline hanging.
_____ 12. Saline line plugged into short "Y" segment.
_____ 13. Two hemostats on saline "Y" segment.
_____ 14. Hemostat on end of arterial blood line (Long "Y").
_____ 15. Hemostat on end of venous blood line.
_____ 16. Arterial "Y" segments filled with saline (no air).
_____ 17. Venous blood line free from air below the drip chamber.
_____ 18. Conductivity needle between 95 and 105.
_____ 19. Conductivity alarms working and set on 95 and 105.

_____20. Temperature needle between 95^0 and 105^0.

_____21. Temperature alarms working and set on 95^0 and 105^0.

_____22. Blood level detect alarm working.

_____23. Venous pressure alarms working. (Arterial pressure alarms working if used.)

_____24. Necessary pieces of tape are torn.

_____25. Sterile 4" x 4"s are opened.

_____26. Small amount of Betadine® solution in cup for arm preparation.

_____27. Vital signs checked and recorded on chart.

_____28. Xylocaine drawn up in small syringe.

_____29. Heparin prepared.

_____30. Needles unwrapped.

_____31. Fistula arm scrubbed with Betadine® for appropriate length of time.

STARTING DIALYSIS WITH A SIMPLE A-V FISTULA

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST				
A. Preparing the Arm		1	2	3	4	5
1. Put on gloves.	1. Keeps blood out of cuts, reduces infection.					
2. Clean arm with Betadine® solution for arterial needle stick.	2. Reduces germs on skin that might enter with needle.					
3. Apply tourniquet above elbow.	3. Expands vessel for site selection.					
4. Take cap off xylocaine syringe, being careful not to contaminate the needle.	4. If germs enter skin with needle, infection may result.					
5. Insert needle barely under skin, pull back on plunger.						
6. If no blood enters the syringe, push plunger in until a small bubble forms under the skin and release the tourniquet.	6. Prevents giving xylocaine into the vein instead of under the skin.					
7. Pull needle out and replace the cover over the needle carefully.	7. Unprotected needles may lead to accidental sticks.					
8. Place a sterile 4" x 4" gauze over the area you have numbed.	8. Prevents airborne germs from landing on venipuncture site.					
9. Remove tourniquet.	9. Prevents excess pressure build-up in the vein, which may cause tearing on needle entry.					

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST				
		1	2	3	4	5
B. Inserting the Arterial Needle 1. Put a hemostat on the arterial needle line.	1. Prevents backflow of blood through end of tubing.					
2. With the sterile 4" x 4", wipe any blood off the site where you plan to insert the needle.	2. Helps you to see venipuncture site.					
3. Put on tourniquet.	3. Expands vessel for easier venipuncture.					
4. Remove the plastic cover on the end of the needle.	4. Exposes shaft of needle.					
5. Holding the needle "bevel up", insert it into the vessel.	5. Bevel up creates skin flap which later aids in clotting site. Prevents coring of tissue. Adjust angle of entry for depth of vessel and length of needle.					
6. Remove the tourniquet.	6. Continued pressure may cause tearing or leaking of vessel.					
7. Cover the site with a sterile cover, and tape the needle down securely.	7. Prevents needle from slipping out. Taping directly over site exposes it to germs.					
8. Remove the cap from the end of the needle line.	8. Allows blood to flow after clamp is removed.					

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST				
		1	2	3	4	5
9. Open hemostat slowly and let the blood flow to the tip of the line. Reclamp the line with hemostat.	9. Gets rid of air by filling line with blood. It may be necessary to reapply tourniquet to get this backflow.					
10. Remove the cap on the arterial blood line. (The long "Y" segment.)	10. Allows needle line to connect to blood line.					
11. Wipe the tip of the line with Betadine®. Dry the tip of the line with a sterile 4" x 4".	11. Reduces number of germs. All things touching blood stream must be sterile.					
12. Connect the arterial blood line and the arterial needle line.	12. This completes the blood circuit from you to the dialyzer.					
13. Dry the connection and bridge it with clear tape.	13. Tape reduces chances of line separation but won't stick to wet surfaces.					
14. Remove the hemostat on the needle line, blood line, and the saline "Y".	14. Allows saline to move into the line.					
15. Let enough saline run into the arterial line to clear it of blood and reclamp line.	15. The blood may clot in the line while venous needle is being inserted.					

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST				
		1	2	3	4	5
16. Replace the two hemostats on the saline "Y".	16. Reduces chances of accidental saline infusion.					

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST 1	2	3	4	5
C. Inserting the Venous Needle (Omit items marked * if using a teflon needle.)						
1. Wipe the area where you plan to put the needle with Betadine.®	1. Reduces number of germs entering skin with needle.					
2. Apply tourniquet above the selected venipuncture site.	2. Expands vessel for easier venipuncture.					
3. Remove cap from lidocaine or xylocaine syringe. Be careful not to contaminate the needle.	3. If germs enter skin with the needle, they may cause infection.					
4. Insert 25g needle barely under skin and pull back on plunger.						
5. If no blood enters syringe, push plunger until small bubble appears under the skin.	5. Numbs area of venipuncture and reduces chance of giving medication into vein instead of under the skin.					
6. Pull needle out and replace the cover over the needle.	6. Unprotected needles may lead to accidental sticks.					
7. Remove tourniquet.						

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST 1	2	3	4	5
8. Place a sterile 4" x 4" over the area you have numbed.	8. Keeps airborne bacteria from contaminating your site.					
*9. Put a hemostat on the venous needle line.	9. Prevents backflow of blood through end of tubing.					
10. With sterile 4"x 4", wipe any blood off the site where you plan to insert the needle.	10. Helps you to see your veni-puncture site.					
11. Put on tourniquet.	11. Expands vessel for easier veni-puncture.					
12. Remove plastic cover and holding the needle "bevel up" insert it into the vessel.	12. Reduces coring of skin and makes flap which later helps site clot. Adjust angle for depth of vessel.					
13. Remove tourniquet.	13. Prevents excess pressure build-up in vein which may cause tear-ing or leaking.					
14. Place sterile cover over site and tape the needle down securely.	14. Prevents needle from slipping out. Do not tape directly over site!					
15. Remove the cap from the end of the needle line.	15. Allows blood to flow when clamp is removed.					

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST 1	2	3	4	5
16. Open the hemostat slowly and let the blood flow to the tip of the line. Reclamp the line with hemostat.	16. Gets rid of air by filling line with blood.					
17. Remove the cap on the end of the venous blood line.	17. Allows blood line to connect to needle line.					
18. Wipe the tip of the line with Betadine®. Dry the tip of the line with a sterile 4" x 4".	18. Decreases number of germs. All things touching blood stream must be sterile.					
19. Connect the venous blood line and the venous needle line.	19. Complete blood circuit from the dialyzer back to you.					
20. Dry the connection and bridge it with clear tape.	20. Tape prevents line separation but won't stick to wet surfaces.					

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST				
		1	2	3	4	5
D. Beginning the Dialysis*						
1. Remove clamp on arterial needle line.	1. Lets blood move through arterial line to the dialyzer.					
2. Start blood pump slowly. Remove venous line clamp.	2. Rapid removal of blood from you may be uncomfortable and dangerous. Always remove clamps when pump is running.					
3. Watch the venous drip chamber to be certain it does not fill with air. You should continue watching the drip chamber until the blood is all the way through the blood lines and dialyzer.	3. Drip chambers are to catch air. When they become filled with air, this air may pass to you. Remove excess air using a syringe and needle to remove air.					
4. Move your level detect alarm to the operative position.	4. Warns that drip chamber has too much air in it.					
5. Check blood flow rate.	5. Adequate blood flow is one of the most important factors for a good treatment.					
6. Release the hemostat on your venous pressure monitoring line.	6. Allows venous pressure reading to register on monitor.					

*This sample procedure is written to begin dialysis <u>without</u> a saline prime. Insert your dialysis unit's procedure here if you begin dialysis <u>with</u> a saline prime.

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST 1	2	3	4	5
7. Set your venous pressure alarm limits. (If present, set arterial pressure alarm sensors.)	7. Warns of clots, needle through the vessel wall, kinks, clamps line separations. Do not set lower limit below zero! (Arterial pressure increases may indicate a clotted dialyzer.)					
8. Set your negative pressure gauge.	8. Regulates the amount of fluid removal during dialysis.					
9. Take your blood pressure.	9. Shows your body's response to blood shift.					
10. Record all statistics on your dialysis record sheet.	10. Do it now. You won't remember later. These record sheets are used by your treatment team to evaluate your progress and to anticipate problems.					

STARTING DIALYSIS WITH AN EXTERNAL SHUNT

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST 1	2	3	4	5
A. <u>Preparing the Shunt</u>						
1. Wash hands thoroughly and put on gloves.	1. Hand washing is the best prevention of infection. Gloves prevent blood from entering cuts in skin.					
2. Remove old dressing and discard.						
3. Check exit sites on shunt for drainage or redness and report immediately if any present.	3. Early detection of infection may save your vascular access.					
4. Secure shunt by tunneling tape over each side of shunt tubing, and place small dressing over exit sites and tape securely.	4. Prevents accidental pulling at sites. New dressing prevents bacteria from contaminating sites.					
5. Remove tape which connects the arterial and venous ends of the shunt together.	5. Allows arterial and venous sides of shunt to be separated.					

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST 1	2	3	4	5
B. <u>Connecting Shunt to Dialysis Equipment</u>						
1. Prep disconnect point with Betadine®.	1. Decreases number of bacteria which cause infection.					
2. Place prepped shunt on a sterile 4" x 4".	2. Acts as sterile field for opening shunt.					
3. Clamp each side of shunt with bulldog clamps.	3. Prevents bleeding when disconnected.					
4. Separate shunt with disconnect forceps, making sure to wrap each end of the open shunt in a sterile 4" x 4". (Remove connector unless shunt lines are used.)	4. Forceps allow shunt to be opened without tearing. 4" x 4"'s prevent contamination of blood stream. If shunt lines are used insert additional connecting piece.					
5. Prep end of arterial side of shunt with Betadine®.	5. Decreases germs.					
6. Remove the cap on the arterial blood line and prep the tip with Betadine®.	6. Decreases germs and prevents infection.					
7. Connect arterial blood line to arterial side of shunt using the teflon connecting piece.	7. Completes blood circuit from you to the dialyzer. Connecting piece prevents spreading of shunt ends.					

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST				
		1	2	3	4	5
8. Dry the connections with sterile 4" x 4" and secure with connecting tape at <u>both</u> joints. Remove hemostat on arterial line and place hemostat on saline line.	8. Prevents accidental line separation. Prevents backup of blood into saline line or accidental saline administration.					
9. Wipe end of venous side of shunt with Betadine®.	9. Reduces number of infection causing germs.					
10. Remove cap from venous blood line and prep tip with Betadine®.	10. Reduces germs.					
11. Connect venous blood line.	11. Completes blood circuit from dialyzer back to you.					
12. Dry the connections and secure with clear bridge tape at <u>both</u> joints.	12. Prevents line separation.					
13. Tape the lines securely to the shunt extremity.	13. Keeps lines from pulling on shunt. When you move your arm the lines will move also.					

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST 1	2	3	4	5
C. <u>Beginning the Dialysis</u>						
1. Remove hemostat from the venous side. (Do not leave arterial shunt site clamped while attaching venous side.)	1. Allows blood to leave you and fluid or blood to begin returning to you when the pump is turned on.					
2. Start blood pump slowly.	2. A rapid pump may strain your arterial site and rapid blood shift may be uncomfortable or dangerous.					
3. Watch the drip chamber to be certain it does not fill with air. You should continue watching the drip chamber until the blood is all the way through the blood lines and dialyzer.	3. The drip chamber catches air that would otherwise go into you. Excess air may be removed with a needle and syringe.					
4. Move your level detect alarm to the operative position.	4. Warns that there is too much air in the drip chamber.					
5. Check blood flow and adjust the level of your drip chamber.	5. Good blood flow is important to a good treatment. Drip chamber level should prevent backup into pressure monitor while not causing unnecessary alarms.					

COMPLETING DIALYSIS

COMPLETING DIALYSIS WITH AN A-V FISTULA

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST 1	2	3	4	5
A. Discontinuing Heparin Infusion						
1. Turn off heparin pump and clamp heparin infusion line at the prescribed time.	1. Infusion should be stopped long enough to allow the venipuncture sites to clot easily after needle removal.					
2. Remove syringe from heparin pump.						
3. Remove plunger from heparin syringe and fill the barrel of the syringe with a 4" x 4" gauze.						
4. Attach a sterile needle to the syringe.	4. All things in contact with the blood must be sterile.					
5. Place the syringe and an alcohol sponge within reach of your venous drip chamber.						

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST 1	2	3	4	5
B. Preparing to Stop Dialysis						
1. Spread the venous pressure alarm limits.	1. Prevents unnecessary alarm noise.					
2. Reduce negative pressure until it is below zero.	2. Releases blood cells from the membrane walls where they sometimes stick during treatment.					
3. Reduce blood flow to approximately 100 ml/minute.	3. Slower blood flow rate allows more control during the take off procedures.					
4. Have sterile 4"x 4" gauzes and bandaids available.	4. Sterile 4"x 4"s are used to apply pressure at venipuncture sites. Bandaids cover sites after clotting.					
5. Put on gloves.	5. Prevents getting blood on hands; reduces possibility of infection.					

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST 1	2	3	4	5
C. Saline Rinse						
1. Turn off blood pump.	1. Stops the flow of blood from you to the dialyzer.					
2. Put hemostat on arterial line between the "Y" and the dialyzer. Remove both hemostat on saline "Y" line.	2. Causes saline to move toward you.					
3. Rinse arterial line and needle with small amount of saline until line is clear.	3. Returns the blood to you.					
4. Put hemostat on arterial needle line.	4. Prevents blood from entering the line again.					
5. Remove hemostat from below "Y" and turn on blood pump.	5. Blood begins to return from the dialyzer to you.					
6. Rinse dialyzer with normal saline prescribed by your dialysis unit's procedures.	6. The amount of rinse varies with the size and type of dialyzer and with your individual need. It is important to use enough normal saline to return the blood from the dialyzer to you.					
7. When saline has run in, turn off blood pump and clamp off the saline line with hemostat.						
8. Remove saline line from the "Y" and leave the cap open.	8. Provides port of entry for air.					

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST 1	2	3	4	5
D. <u>Air Rinse</u>						
1. Turn on pump.	1. Air will push the saline through the dialyzer.					
2. When most of the blood has been returned, and air appears at the venous end of the dialyzer in the blood line, place an <u>OPEN</u> hemostat on the venous line <u>BELOW</u> the drip chamber.	2. Line can be clamped quickly if necessary to prevent rapid air movement.					
3. When air has lowered the drip chamber, put hemostat on venous line and turn off blood pump. Disarm blood level detector.	3. Leaving the blood pump running could force blood past the hemostat and into you. Lowering the drip chamber too much will trigger the alarm.					
4. Wipe top of drip chamber with alcohol or Betadine and insert large syringe with sterile needle attached and plunger removed.	4. Insertion of the air vent will allow the blood remaining in the dialyzer to fill the venous drip chamber as air leaves through the vent.					
5. Turn on blood pump.	5. Returns blood from the dialyzer back to you.					

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST 1	2	3	4	5
6. When there is only a small amount of blood returning to the drip chamber, turn pump off, and remove air vent. Discard vent and recap needle.						
7. Put hemostat on venous line 6 inches from needle.	7. Protects against rapid movement of air when clamp under drip chamber is removed.					
8. Remove hemostat from venous line below drip chamber.						
9. Release hemostat on venous needle line slowly. If the blood does not begin to travel down the venous line you may need to turn on the blood pump. Be certain the pump is set on a very slow speed.	9. Usually the remaining blood will return slowly by gravity. A slow pump speed will let the remaining blood return but with complete control of the air behind it.					
10. Hold hemostat over the venous line during reinfusion.	10. This is extra protection for you in case a clamp breaks or is dropped.					
11. Turn off blood pump when air reaches venous sleeve (medication port).	11. You do not want air to get into your vein.					

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST				
		1	2	3	4	5
12. Clamp venous line with both hemostats when air is 12 inches from needle. <u>DO NOT ALLOW AIR TO GO FARTHER</u>.	12. Double clamping protects you from accidentally getting air. Air in your veins can kill you.					

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST				
		1	2	3	4	5
E. <u>Post Dialysis Care</u>						
1. Remove needles (whichever one is more accessible, remove first). Apply pressure until bleeding stops.	1. Reduce trauma to remaining needle site. Normally the venous site will clot most easily.					
2. Clean fistula area with hydrogen peroxide to remove Betadine®, blood and prevent the skin from drying.	2. Good skin care can prevent infections and reduce irritation.					
3. Apply bandaids and/or ace bandage.	3. Keeping sites covered until some healing has taken place will reduce chances of infection.					
4. Take BP, temperature, pulse and weight. Record vital signs on the dialysis record.	4. Gives record of your response to treatment and indicates any treatment changes that need to be made.					

COMPLETING DIALYSIS WITH AN EXTERNAL SHUNT

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST 1	2	3	4	5
A. Discounting Heparin Infusion						
1. Turn off heparin pump and clamp with hemostat heparin infusion line at the prescribed time.	1. Allows sites to clot more easily after needles are removed.					
2. Remove syringe from heparin pump.						
3. Remove plunger from heparin syringe and fill the barrel of the syringe with a 4" x 4" gauze.	3. Will be used to remove air from line later in take off.					
4. Attach a sterile needle to the syringe.	4. All things touching your blood must be sterile.					
5. Place the syringe and an alcohol sponge within reach of your venous drip chamber.						

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST 1	2	3	4	5
B. <u>Preparing to Stop Dialysis</u>						
1. Spread the venous pressure alarm limits.	1. Keeps alarm from sounding unnecessarily when monitor line is removed.					
2. Reduce negative pressure until it is below 50.	2. This improves blood return by releasing blood cells that stick to the membrane during treatment.					
3. Reduce blood flow to approximately 100 ml/minute.	3. Increases control of blood returning from the dialyzer to you.					
4. Remove and discard shunt dressing.						
5. Place a sterile 4" x 4" under the area where teflon extensions connect to arterial and venous blood lines.	5. Provide sterile field for shunt cannulae which have contact with your blood.					
6. Put on gloves.	6. If sterile gloves are used, they will decrease chances of contaminating your blood. Any type glove will keep blood out of any cuts.					

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST 1	2	3	4	5
C. <u>Saline Rinse</u>						
1. Turn off blood pump.	1. Stop the flow of blood out of you and into the dialyzer.					
2. Clamp arterial blood line with hemostat near the bridge connection.	2. Prevents blood loss during line separation.					
3. Place bulldog clamp on arterial silastic tubing. Remove bridge tape and disconnect tubing from blood line.	3. Allows lines to be separated.					
4. Turn on blood pump.	4. Create suction in arterial line which prevents blood from spilling on you.					
5. Release hemostat on arterial blood line. When air is down to the "Y", clamp the line.	5. Returns blood in end of line.					
6. Release hemostat on the saline "Y".	6. Starts pushing blood back to you with saline.					
7. Rinse dialyzer prescribed amount of normal saline.	7. The amount of saline varies with your needs and with the type and size of dialyzer. Most importantly, you should have a thorough return of red blood cells.					

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST 1	2	3	4	5
8. When saline has run into the dialyzer, turn off blood pump and clamp off saline line with hemostat.						
9. Remove saline line from the "Y" and leave the cap open.	9. This allows air to push the saline rinse back to you.					

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST 1	2	3	4	5
D. Air Rinse						
1. Turn on pump.	1. Air will push the blood through the dialyzer.					
2. When most of the blood has been returned, air will appear at the venous end of the dialyzer in the blood line. Place an OPEN hemostat on the venous line BELOW the drip chamber.	2. You will be prepared to clamp quickly if necessary.					
3. When air has lowered the drip chamber, clamp venous line with hemostat and turn off blood pump. Disarm blood level detector.	3. Prevents too much air in chamber and protects you. Lowering the level too much will trigger the alarm unless it is off.					
4. Wipe top of drip chamber with alcohol and insert air vent.	4. All things touching your blood should be sterile. Insertion of the air vent will allow the blood remaining in the dialyzer to fill the venous drip chamber.					
5. Turn on blood pump.	5. Continues return of blood and removal of air through vent.					

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST 1	2	3	4	5
6. When there is only a small amount of blood returning to the drip chamber, turn pump off, and remove air vent. Discard vent and needle.						
7. Put hemostat on the venous line 6 inches from the venous line connection.	7. Prevents rapid infusion of air.					
8. Remove hemostat from venous line below drip chamber.	8. Will allow blood to continue returning when second clamp is removed.					
9. Release hemostat on venous needle line slowly. If the blood does not begin to travel down the venous line, you may need to turn on the blood pump. Be certain the pump is set on a very slow speed.	9. Letting blood move by gravity or with a slow pump gives better control over movement of blood and air. Always be in control of the movement of the air.					
10. Hold open hemostat over the venous line during reinfusion.	10. Extra protection in case a clamp breaks or is dropped.					
11. Turn off blood pump when air reaches venous sleeve.	11. Decrease pressure that is pushing air toward you.					
12. Clamp venous line with both hemostats when air reaches the hemostat 6" from needle. <u>DO NOT ALLOW AIR TO GO FARTHER</u>.	12. Added safety against getting air.					

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST				
		1	2	3	4	5
E. <u>Post Dialysis Care</u>						
1. Place bulldog clamp on venous silastic tubing. Remove bridge tape and disconnect tubing from blood line.	1. Prevents blood loss when cannula is separated from blood line.					
2. Clean ends of arterial and venous shunt with Betadine® and a sterile 4" x 4" gauze.	2. Decreases number of germs. Germs should not get into your blood stream.					
3. Attach sterile connector. Dry and bridge the connection with tape.	3. Taping gives extra protection against accidental separation. Tape will only stick to dry surfaces.					
4. Care for external shunt as outlined in the procedure "Cleaning and Dressing of External Shunt."	4. Shunt care is often done after treatment to remove accidental contamination which occurs during dialysis procedure.					
5. Take blood pressure, temperature, pulse and weight. Record vital signs on the dialysis record.	5. Shows your response to treatment, gives information for necessary treatment changes.					

SAMPLE PROCEDURES FOR POSITIVE PRESSURE DIALYSIS

1. Starting Dialysis with a Sample A-V Fistula

   A. Beginning the Dialysis

2. Completing Dialysis with an A-V Fistula

   A. Preparing to Stop Dialysis
   B. Saline Rinse
   C. Post Dialysis Care

SAMPLE

STARTING DIALYSIS WITH A SIMPLE A-V FISTULA

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST 1	2	3	4	5
A. Beginning the Dialysis						
1. Connect arterial line to needle. Remove both hemostats.	1. Completes blood circuit from you to the dialyzer.					
2. Connect venous line to needle. Remove hemostat on venous needle. Keep hemostat on venous line.	2. Completes blood circuit from the dialyzer. Only one hemostat is needed to keep positive pressure inside the coil and keep venous chamber from emptying.					
3. Put harvard clamp on venous line and tighten.	3. Harvard clamp will maintain positive pressure inside the coil after the clamp is removed from the venous lines.					
4. Clean rubber arterial sleeve with alcohol swab. Insert heparin syringe needle into sleeve. Do not inject heparin.	4. Decreases bacteria. Heparin needs to be ready to inject before too much blood enters dialyzer.					
5. Turn blood pump to 150cc/min	5. Too rapid blood pump rate may cause too rapid a shift which could be dangerous.					
6. As blood is drawn past arterial sleeve, pull back on plunger. If you obtain blood, inject heparin slowly. If you do not, adjust needle in sleeve.	6. Want to assure proper needle placement. Heparin keeps blood from clotting.					

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST 1	2	3	4	5
7. Make sure air bubble detector is already on "armed".	7. Placed on armed when priming is completed. Note presence of air in venous chamber or venous lines. Air bubble detector is not working if on bypass. Air, if present, could then go into bloodstream. This is dangerous.					
8. Release hemostat on venous line.	8. Keeping hemostat on venous line will prevent blood return and will build pressure up inside coil. Could cause ruptured coil if pressure builds above 300. Usually alarm sounds or pump stops.					
9. Adjust harvard clamp to keep positive pressure between 20-40.	9. Harvard clamp regulates positive pressure during dialysis.					
10. Watch level in venous chamber until level seems stable, at about 3/4 full. Adjust height as necessary by releasing hemostat on vent line and pulling out air with attached syringe.	10. Level may be decreased when hemostat is removed from venous line due to poor priming or positive pressure below zero before harvard clamp is adjusted. (Air will lower venous chamber level.) Overflowing venous chamber can ruin or damage the positive pressure monitor so it must be watched carefully.					

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST 1	2	3	4	5
11. Turn negative pressure alarm on.	11. Turns alarm sound on. Notes when insufficient blood is coming out of body.					
12. Adjust dialysis fluid flow-meter to deliver fluid at desired rate.	12. Need to bring fresh dialysis fluid from bath tank to top compartment.					
13. Check blood pressure and pulse.	13. Shows your body's reaction to blood shift.					
14. Increase blood pump speed 50 points every 15 minutes until blood flow between 250cc to 300cc/min.	14. Gradual body adjustment to blood shift. Good blood flow necessary to obtain good dialysis.					
15. Increase flow of dialysis fluid to meet your dialysis needs.	15. As blood flow increases more dialysis fluid is needed for a good dialysis.					

COMPLETING DIALYSIS WITH AN A-V FISTULA

SAMPLE

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST 1	2	3	4	5
A. Preparing to Stop Dialysis						
1. Prepare 4" x 4"'s, peroxide, tape, and ointment.	1. Organize supplies needed to apply pressure to site and dress puncture sites.					
2. When clotting time is between 10 to 20 minutes, discontinue heparin.	2. Heparin effort will be wearing off, thus clotting will take place faster.					
3. Hang bottle or bag of normal saline.	3. Need sufficient amount to rinse back blood.					
4. Check blood pressure.	4. Need to have stable BP when coming off dialysis. May require more saline if low.					
5. Put on gloves.	5. Protect self from bacteria and direct blood contact.					
6. Turn negative pressure alarm OFF.	6. Prevent unnecessary alarm noise.					
7. Turn blood pump down to 100cc/min.	7. Slower blood flow rate allows more control and allows more time to do a thorough job.					
8. Lower positive pressure to between 20-40. You should maintain positive pressure, 20-40, until end of procedure.	8. No further ultrafiltration necessary. Do not want to create "negative pressure".					

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST 1	2	3	4	5
9. Note venous drip chamber level. Keep 3/4 full. Adjust level when blood pump and positive pressure are turned down.	9. Drip chamber level lowers when positive pressure and blood pump speeds are decreased.					
10. Put one hemostat on arterial needle and another hemostat on arterial blood line closest to you. Turn blood pump off.	10. Stops flow of blood coming from body. Enables disconnection of arterial needle and arterial line. No blood can be pulled by blood pump until hemostat is removed from line and blood pump is turned on. Always turn off blood pump when clamping a bloodline.					

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST 1	2	3	4	5
B. <u>Saline Rinse</u>						
1. Disconnect arterial line from arterial needle. Turn blood pump on.	1. To resume return of blood to dialyzer. Pulls air up arterial line.					
2. Put hemostat on arterial line as air reaches negative pressure monitor. Turn blood pump off.	2. To prevent air from going into dialyzer. Blood flow stops.					
3. Take hemostat off saline line. Turn blood pump back on.	3. Release saline to rinse blood back to body. Blood flow starts again.					
4. When venous line (line coming out of coil) turns light red:	4. Want to rinse as much blood as possible out of both ends of coil.					
a. switch recirculating pump to "standby"	a. "standby" maintains power to blood pump.					
b. switch top compartment on "drain"	b. "drain" empties dialysis bath from top compartment.					
c. lift coil out and invert.						
5. When venous line turns light pink:	5. Have sufficient return of blood:					
a. turn blood pump off	a. to leave blood pump running could give extra saline or air					
b. clamp venous line with hemostat	b. to prevent any more saline from being infused					

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST 1	2	3	4	5
c. clamp venous needle with hemostat	c. to prevent bleeding from venous needle					
d. disconnect venous line from venous needle.	d. dialysis completed					
6. Check blood pressure before needles are removed. If condition indicates, give extra saline through the venous needle.	6. Shows your body's reaction to the return of your blood. Replace low volume if necessary.					

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST 1	2	3	4	5
C. <u>Post Dialysis Care</u>						
1. Check blood pressure (standing) before removal of needles.	1. Can give extra saline through venous needle if condition indicates.					
2. Remove tape from access dressing carefully.	2. Tape pulls arm hairs.					
3. Remove needles. a. pull needle straight out (whichever one is more accessible, remove first). b. Do not remove second needle until first needle bleeding site is under control. c. apply pressure until bleeding stops: 1. Arterial needle - apply pressure just below site (depending on direction of needle). 2. Venous needle - apply pressure just above the site.	3. a. Reduces trauma. b. Less chance of excessive bleeding. c. Wait for clot formation. Hole in fistula is not at the same spot in skin.					
4. Wipe area around venipuncture sites with hydrogen peroxide Dry area with sterile 4" x 4".	4. Removes dried blood. Avoid venipunctures to prevent rebleeding.					

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST				
		1	2	3	4	5
5. Apply any ointment perscribed over needle exit sites.						
6. Apply sterile cover over site. Tape in place.	6. Decreases infection possibilities until some healing has taken place.					
7. If re-bleeding occurs - apply pressure again.	7. Pressure will again stop bleeding.					

INTERMITTENT PERITONEAL DIALYSIS PROCEDURES

TABLE OF CONTENTS

INSTRUCTIONS TO PATIENTS

The sample procedures in this self-dialysis training manual are written in three columns so the training may be documented as you learn the procedures.

As discussed previously, the sample procedures are intended to be a guide to the dialysis unit staff to use as teaching tools for self-dialysis training. Substitutions for local terminology or local custom may need to be inserted.

THREE COLUMN APPROACH

Essential Steps -- The steps listed in this column are the steps necessary to perform the particular dialysis procedure in a safe and efficient manner.

Explanation -- The information given in this column offers some of the reasons a particular step must be done the way it is suggested.

Practice Checklist -- There are five spaces to check off five practice sessions of each of the essential steps. The trainer should use this column to check off the number of times you are observed practicing a particular step before you are proficient in it. The trainer may add more lines to make additional spaces if you need more practice. When you are proficient in a particular task, the trainer writes his/her initials and the date in the space following the last check mark. This means the trainer has judged you competent in this area.

PERITONEAL DIALYSIS FLOW SHEET

NAME: ____________________

DATE/TIME	WEIGHT	STAND-ING BP	SOLUTION EXCHANGE			DRAINAGE			TREATMENT COMMENTS
			NO.	CONC.	DWELL	COLOR	QUALITY	AMOUNT	

DEFINITION OF TERMS USED ON PERITONEAL DIALYSIS ORDER SHEET

This sample peritoneal dialysis order sheet is intended to incorporate many of the features of IPD and CAPD. It should be as flexible as your needs require while serving as a guideline for your treatment. The type and frequency of change in this order is determined by how you feel. It is your responsibility to communicate as fully as possible with your treatment team so that the plan may continue to reflect your treatment needs.

Primary Physician -- The name of your primary physician is listed in order that you know who to contact in case of emergency.

Diagnosis -- Because much of your communication with your treatment team will be done by telephone, it may be important to know your diagnosis in order that appropriate treatment changes can be made.

Type of Peritoneal Treatment -- You may be either on intermittent peritoneal dialysis or continuous ambulatory peritoneal dialysis.

Type of Equipment -- There are many types of equipment for automated IPD. Knowing the type you use may help your treatment team to troubleshoot problems.

Frequency/Schedule -- This serves as a guideline to you for planning your treatment. They are most effective when scheduled at regular intervals because this minimizes the fluctuation of wastes and fluid in your body.

Solution -- The kind of solution you use and the number of exchanges you do regulate the amount of fluid removed during treatment. The use of frequent high dextrose exchanges will remove fluid quickly and should be done with care.

Solution Additives -- Because some people have problems with fibrin clotting their peritoneal catheters, occasional use of heparinized solution may be tried. If peritonitis occurs, an antibiotic may be added to the solution in order to clear the infection.

Ideal Weight -- You will know your ideal weight. Generally it is the weight at which your blood pressure is as normal as possible without medications. You should also have no edema of your lungs or extremities.

Medications -- This serves as a record and a reminder of what medications you should be taking while on and off dialysis. Whenever a new medication is prescribed, feel free to mention those to which you are allergic so that potentially harmful medications are not prescribed.

Diet -- Your dietician will discuss this section with you. The limitations are usually determined by the nature of your kidney problem. Some people find they have few restrictions.

Routine Lab Work -- These are the tests that will be drawn when you return to your center for routine checkups. If you need closer observation, some of these tests may be performed more frequently. Results of your laboratory test will help determine what changes are necessary in your treatment.

Signature -- You and your physician should both sign your order sheet. Your treatment team needs to know that you are aware of your treatment prescription and that its meaning is clear to you.

PERITONEAL DIALYSIS ORDER SHEET

PATIENT NAME: ______________________ PRIMARY PHYSICIAN: ______________________

DATE: ______________ DIAGNOSIS: ______________________________

TYPE OF PERITONEAL TREATMENT: ________ IPD ________ CAPD ________ Other

TYPE OF EQUIPMENT: ____

FREQUENCY/SCHEDULE OF TREATMENT: ________________________________

SOLUTION: 1.5% DEXTROSE ____ No. of Exchanges ____ 30% DEXTROSE ____ No. of Exchanges ____

4.5% DEXTROSE ____ No. of Exchanges ____ 50% DEXTROSE ____ No. of Exchanges ____

SOLUTION ADDITIVES: __________ Heparin __________ Antibiotic __________ Other

(NAME)

IDEAL WEIGHT: __________ kilograms __________ lbs.

MEDICATIONS:

ROUTINE MEDICATIONS	TREATMENT MEDICATIONS	ALLERGIES

DIET:

PROTEIN __________ Gm.

POTASSIUM: __________ Gm.

SODIUM: __________ Gm.

FLUID __________ ml.

CALORIES: __________ ADA

ROUTINE LAB WORK:

BUN: ________ weekly ________ monthly

CREATINE: ________ weekly ________ monthly

POTASSIUM: ________ weekly ________ monthly

HEMATOCRIT: ________ weekly ________ monthly

PATIENT SIGNATURE: ______________________ PHYSICIAN SIGNATURE: ______________________

1 PERITONEAL CATHETER AND EXIT SITE CARE*

SAMPLE

<u>Gather Supplies</u>

Bottle Betadine® Solution

Bottle Hydrogen Peroxide

Tube Betadine® Ointment (optional)

Sterile Applicators

Sterile 4" x 4"'s

Sterile Barrier Towel (with plastic lining)

Sterile Gloves

Roll of Paper Tape

Face Masks

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* Some dialysis units may prefer to do this as a clean procedure rather than a sterile procedure.

Some units do not cover the exit site with a dressing, so fewer supplies will be needed.

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST 1	2	3	4	5
1. Wash hands.	1. See Handwash Procedure.					
2. Put on mask.	2. All persons in room must put on masks to reduce airborne bacteria.					
3. Open supplies and place sterile items on sterile barrier towel.	3. Keeps sterile supplies sterile. Soak one set 4"x 4"with Betadine.® Carefully squeeze ointment onto field.					
4. Remove old dressing and discard.	4. Put in plastic bag to prevent spread of any infection.					
5. Palpate catheter tunnel and cuff.	5. Note any tenderness, swelling or redness.					
6. If your exit site has been draining and a crust has built up around the catheter, use applicators soaked with hydrogen peroxide to remove the crust.	6. Peroxide may be poured directly on skin and sterile applicators used to remove crust.					
7. Wash skin around catheter with soap and water.	7. If you are doing this catheter care after your daily shower or bath, you do not need to wash again.					
8. Rinse completely. 9. Put on sterile gloves.						

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST 1	2	3	4	5
10. Scrub abdomen around exit site with Betadine® soaked 4" x 4". Hold catheter up with Betadine® soaked 4" x 4".	10. Handle catheter gently. Do not twist or pull. Work from catheter site outward.					
11. Cleanse entire length of catheter with Betadine® soaked 4" x 4", using gentle rotating motion.	11. Work from catheter exit site up to catheter cap. Reduces germs.					
12. Cleanse catheter cap by using rotating motion with Betadine® soaked 4" x 4".	12. Reduces germs which may enter at connection time.					
13. Dry immediate area of exit site with sterile, dry 4" x 4". Avoid scratching or irritating the area.	13. If you note skin irritation, wrap the adapter in a sterile 4" x 4" to lessen its contact with the skin. Broken areas in skin may allow germs to enter.					
14. If the catheter is new, or if there is any drainage from exit site, you may need to apply Betadine® ointment around the exit site.	14. Follow instructions from dialysis staff. In case of allergy another protective ointment will be recommended.					
15. Redress with sterile 4" x 4"s. Secure with paper tape. Allow air to circulate.	15. Curve catheter in smooth loop without any kinks. Do not use any sharp instruments near the catheter. (Do not use scissors to cut dressing.)					

INTERMITTENT PERITONEAL DIALYSIS
CONNECTION PROCEDURE

<u>Gather Supplies</u>

On/Off Tray

Betadine® Solution

Betadine® Swabs

Sterile Gloves

Face Masks

Tape (paper and adhesive)

Clamps (hemostats or bulldogs)

<u>Preparation of Equipment</u>

The automatic peritoneal dialysis machines are set up according to the manufacturer's instructions. See Operator's Manual.

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST				
		1	2	3	4	5
PREPARATION						
1. Machine has been primed according to instructions.	1. All equipment should be ready to go. Disorganization leads to contamination.					
2. Empty bladder and bowel if possible.	2. Allows greatest possible room for fluid inflows.					
3. Check vital signs (weight, BP, P, and T) and record on flow sheet.	3. Provides a base line from which to judge your response to treatment.					
4. Tear tape.	4. Used to stabilize catheter and hold dressing in place.					
5. Put on face mask.	5. Prevents breathing airborne bacteria into the catheter.					
6. Open on/off tray.						
7. Remove gloves and lay packet aside.	7. Will remain sterile for use later.					
8. Remove drapes, make sterile field, using plastic tongs included in the kit.	8. Keeps drapes sterile.					
9. Remove bulldog clamp (if using) and place on corner of sterile field.	9. Be careful not to contaminate the field.					
10. Pour Betadine® and other solutions into compartments.						

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST				
		1	2	3	4	5
11. With tongs in one hand and patient line in the other hand, slide line into empty compartment of tray. Secure it in tray.	11. Prevents line from slipping.					
12. Remove dressing from catheter and place bulldog clamp on catheter.	12. Keeps fluids from moving until you unclamp.					
13. Empty patient line of air and cold dialysate, if you are dialyzing alone; otherwise, let your assistant do this just before you are ready to connect.	13. Evacuates line of extra air and cold dialysate which can be uncomfortable in the abdomen.					
14. Put on sterile gloves.	14. Prevents germs on hands from contaminating catheter and sterile supplies.					
15. Keep sterile field sterile.						
16. With a 4" x 4" gauze or cotton tipped swab dipped in Betadine® proceed to clean exit site and surrounding area.	16. Always use a circular motion starting close around catheter and working outward. Reduces bacteria to a minimum. Prevents carrying bacteria from dirty to cleaner areas.					

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST 1	2	3	4	5
17. Grasp catheter with 4"x 4", clean catheter from exit site upward, scrubbing with Betadine® soaked 4"x 4". Scrub around bulldog clamped portion of catheter, also.	17. Reduces germ count.					
18. Remove catheter cap with 4"x 4" continuing to scrub upward to the tip of the catheter and around where the connection will be made.	18. Reduces germ count.					
19. Scrub for a minimum of 5 minutes.	19. Insures that germs are destroyed.					
20. Connect patient line to catheter.	20. Creates pathway for inflow and outflow.					
21. Dry the junction area with sterile 4"x 4".	21. Keeps the connection from slipping apart. Getting Betadine in the catheter will not cause problems.					
22. Secure junction with bridge tape.	22. Prevents separation.					
23. Remove bulldog clamp and push on abdomen gently to observe any outflow.	23. Removes residual fluid. Fluid should be clear. Report cloudiness, or unusual discomfort.					

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST				
		1	2	3	4	5
24. Double a 4" x 4" and place just over exit site but underneath catheter. Tape catheter in looped position with 1/2" tape, making sure to "tunnel" tape over catheter.	24. Supports catheter and prevents kinking.					
25. Double a 4" x 4" and place beneath catheter just below exit site.	25. Prevents entry of germs.					
26. Cover catheter with 4" x 4" gauze square and tape securely.	26. Prevents entry of germs.					
27. Place bulldog clamp in Betadine® solution.	27. Allows clamp to be sterilizing for future use.					
28. Remove mask and gloves.	28. Areas where germs could cause problems are covered.					
29. Attach patient line to clothing or body with paper tape.	29. Prevents pulling at catheter site.					
30. If no longer outflowing, push inflow button to start cycle.	30. Allows instillation of fresh dialysis fluid. Report unusual discomfort.					

3 INTERMITTENT PERITONEAL DIALYSIS **SAMPLE**

DISCONNECTION PROCEDURE

<u>Gather Supplies</u>

On/Off Tray

Betadine® Solution

Betadine® Swabs

Sterile Gloves

Face Masks

Tape (paper and adhesive)

Clamps (hemostats or bulldogs)

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST				
		1	2	3	4	5
1. After last outflow, push inflow for 30 seconds to allow 250cc of dialysis fluid to enter peritoneal cavity.	1. Provides a cushion for the catheter in the abdomen.					
2. Push standby.	2. Stops everything, puts cycle on hold.					
3. Put on face mask. (All present should mask.)	3. Prevents breathing germs onto catheter.					
4. Prepare on/off tray. Pour Betadine® into compartment. Open package containing sterile catheter cap and drop cap onto tray.	4. Thorough preparation makes procedure go more smoothly.					
5. Tear tape (same as in initial procedure).						
6. Remove dressing from catheter.	6. Exposes area to be worked with. Discard dressing in plastic bag to prevent spread of any infection.					
7. Clamp catheter with bulldog clamp.	7. Prevents unwanted outflow at separation time.					
8. Put on sterile gloves.	8. Prevents contamination of catheter and sterile materials.					
9. Create sterile field with drapes in tray.	9. Creates sterile work area.					

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST				
		1	2	3	4	5
10. With 4" x 4" gauze dipped in Betadine®, clean exit site and surrounding area. Start at catheter site and work outward.	10. Reduces germs around catheter junction. Prevents moving germs from surrounding skin to the catheter site.					
11. Clean catheter, separate catheter from patient line, and clean tip of catheter. Soak tip for a minimum of 5 minutes.	11. Reduces number of germs.					
12. Dry with sterile 4" x 4".						
13. Place sterile catheter cap on catheter.						
14. Apply sterile dressing.						

INTERMITTENT PERITONEAL DIALYSIS
CONNECTION PROCEDURE WITH A BETA CAP®

<u>Gather Supplies</u>

On/Off Tray

Betadine® Solution

Betadine® Swabs

Sterile Gloves

Face Masks

Tape (paper and adhesive)

Clamps (hemostats or bulldogs)

<u>Preparation of Equipment</u>

The automatic peritoneal dialysis machines are set up according to manufacturer's instructions. See Operator's Manual.

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST				
		1	2	3	4	5
1. Machine has been primed according to instructions.						
2. Empty bladder and bowel if possible.	2. Allows room in abdomen for fluid.					
3. Check vital signs (weight, B/P, P, and T). Record on flow sheet.	3. Serves as baseline to judge effect of treatment.					
4. Tear tape.	4. Stabilizes catheter and holds dressing.					
5. Put on face mask.	5. Prevents breathing bacteria onto catheter.					
6. Open sterile drape to make sterile field.	6. Provides a sterile field to hold sterile supplies.					
7. Open 3-5 packages sterile 4"x 4"s and put on sterile drape.	7. Keeps 4"x 4"s sterile.					
8. Remove dressing from catheter.	8. Discard in plastic bag to prevent spread of infection.					
9. Drain patient line of air and cold dialysate, if you are dialyzing alone. Otherwise, let your assistant do this just before you are ready to connect. Drape patient line <u>carefully</u> on sterile drape.	9. Prevents entry of air and cold dialysate into abdomen. Both can be uncomfortable.					

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST				
		1	2	3	4	5
10. Put on sterile gloves.	10. Prevents bacteria on hands from contaminating sterile supplies.					
11. Place 4"x 4"under catheter and cap.	11. Creates small sterile field.					
12. Grip finger guard with one hand and remove hard catheter cap with other hand, dipping cap into cup of Betadine.®	12. Reduces bacteria at connecting point.					
13. Put patient line into catheter connector. Open clamp on catheter and push outflow button.	13. Allows dialysate to drain from patient.					
14. Tape connection with bridge tape.	14. Prevents accidental separation of lines.					
15. Apply Betadine® soaked 4"x 4"s on abdomen around catheter exit site.	15. Reduces bacteria count.					
16. Dress catheter with 4"x 4"s: Double 4"x 4"s and place over exit site and underneath catheter. Tape catheter in looped position with 1/2" tape, making sure to "tunnel" tape over catheter.	16. Supports catheter and prevents kinking.					

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST				
		1	2	3	4	5
17. Remove mask and gloves.						
18. Attach patient line to clothing or body with paper tape.	18. Allows for some movement but prevents tension.					
19. If no longer outflowing, push inflow to start cycle.	19. Replaces residual fluid with fresh dialysis fluid.					

5 INTERMITTENT PERITONEAL DIALYSIS **SAMPLE**

DISCONNECTION PROCEDURE WITH A BETA CAP®

<u>Gather Supplies</u>

On/Off Tray

Betadine® Solution

Betadine® Swabs

Sterile Gloves

Face Masks

Tape (paper and adhesive)

Clamps (hemostats and bulldogs)

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST				
		1	2	3	4	5
1. After last outflow, push inflow for 30 seconds to allow 250cc of dialysate to enter peritoneal cavity.	1. Provides a cushion for the catheter in the abdomen.					
2. Push standby.	2. Stops the cycling.					
3. Put on face mask. (All present should mask.)	3. Reduces bacteria that may be breathed onto catheter site.					
4. Clamp peritoneal catheter.	4. Prevents outflow of fluid at time of separation.					
5. Put on sterile gloves.	5. Keeps supplies sterile as you work with them.					
6. Prepare sterile field with sterile drape and 4" x 4"s.	6. Provides sterile work area.					
7. Separate catheter from patient line and grasp catheter with dry 4" x 4". With Betadine filled bottle, instill Betadine into the catheter. This displaces the peritoneal fluid and it flows to the outside.	7. Destroys any bacteria which may have accidentally entered the catheter.					
8. Remove catheter cap from Betadine® cup and click onto place.	8. Seals catheter until next use. Betadine® in the catheter will not harm you (unless you are allergic).					

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST				
		1	2	3	4	5
9. Dress catheter as usual, making sure catheter stays occluded with clamp.	9. Prevents leaking at catheter tip.					

CONTINUOUS AMBULATORY PERITONEAL DIALYSIS PROCEDURES

TABLE OF CONTENTS

INSTRUCTIONS TO PATIENTS

The sample procedures in this self-dialysis training manual are written in three columns so the training may be documented as you learn the procedures.

As discussed previously, the sample procedures are intended to be a guide to the dialysis unit staff to use as teaching tools for self-dialysis training. Substitutions for local terminology or local custom may need to be inserted.

THREE COLUMN APPROACH

Essential Steps -- The steps listed in this column are the steps necessary to perform the particular dialysis procedure in a safe and efficient manner.

Explanation -- The information given in this column offers some of the reasons a particular step must be done the way it is suggested.

Practice Checklist -- There are five spaces to check off five practice sessions of each of the essential steps. The trainer should use this column to check off the number of times you are observed practicing a particular step before you are proficient in it. The trainer may add more lines to make additional spaces if you need more practice. When you are proficient in a particular task, the trainer writes his/her initials and the date in the space following the last check mark. This means the trainer has judged you competent in this area.

SAMPLE EXCHANGE SCHEDULES FOR CAPD

The solution exchanges will be done as your doctor prescribes them for you. Your doctor may prescribe three, four, or five exchanges per day. It depends on your blood chemistries, your weight and your blood pressure.

Here are two suggested schedules for you to look over, using four exchanges per day.

EXAMPLE 1

First Bag	8:00 a.m.	
		6 hrs.
Second Bag	2:00 p.m.	
		6 hrs.
Third Bag	8:00 p.m.	
		4 hrs.
Fourth Bag	12:00 midnight	
		8 hrs.
First Bag next day	8:00 a.m.	

EXAMPLE 2

First Bag	8:00 a.m.	
		4 hrs.
Second Bag	12:00 noon	
		6 hrs.
Third Bag	6:00 p.m.	
		6 hrs.
Fourth Bag	12:00 midnight	
		8 hrs.
First Bag next day	8:00 a.m.	

CAPD DIALYSIS RECORDS

In the morning after a complete drain,* you will take and record the following information. These may be recorded on the cumulative (combined) chart which follows.

Weight: ________________ kilograms ________________ lbs.

Blood Pressure: ________________ Lying ________________ Standing

Temperature: ________________

Pulse: ________________

Color of effluent (Dialysis Drainage): ______________________________

Condition of Catheter Exit Site: ______________________________

After the above has been recorded, you will determine the strength of dialysis fluid to use next, based on the difference between your ideal dry weight and the weight on the scale today.

The dialysis solutions come in four (4) strengths. The labels all look quite similar, so you must <u>read very carefully</u>.

Dialysis Solution with 0.5% Dextrose
Dialysis Solution with 1.5% Dextrose
Dialysis Solution with 2.5% Dextrose
Dialysis Solution with 4.25% Dextrose

* Some doctors may prefer that you do this after completing the entire exchange procedure.

CAPD DIALYSIS DAILY CUMULATIVE RECORD

NAME: ______________ IDEAL DRY WEIGHT: ______________

DIALYSIS UNIT: ______________ YEAR: __________

DIALYSIS DATE											
WEIGHT											
BLOOD PRESSURE/ LYING											
BLOOD PRESSURE/ STANDING											
PULSE											
TEMPERATURE											
CATHETER EXIT SITE											
EFFLUENT (DRAINAGE)											
DIALYSIS SOLUTION: NO. OF 0.5% USED											
NO. OF 1.5% USED											
NO. OF 2.5% USED											
NO. OF 4.25% USED											

CAPD PROCEDURES
(Continuous Ambulatory Peritoneal Dialysis)

PROCEDURES*

1. Solution Exchange Procedure ("Bag Change")
2. Peritoneal Catheter and Exit Site Care Procedure
3. Tubing Change Procedure (usually done by dialysis staff)

Main Steps in Solution Exchange Procedure ("Bag Change")

A. Preparing for Solution Exchange
B. Draining the Dialysis Solution
C. Adding Medications
D. Connecting New Bag
E. Filling the Peritoneal Cavity

* As technology changes very rapidly in peritoneal dialysis these sample procedures will need to be adapted and modified to reflect the changes in the equipment.

SAMPLE

1

SOLUTION EXCHANGE PROCEDURE ("BAG CHANGE")	
<u>Gather Supplies</u> Betadine® Solution Sterile gauge squares Dialysis solution Tape strips Clamps (white plastic clamps available) Medications (as ordered) Needles and syringes Alcohol wipes	This procedure does not show use of <u>sterile gloves</u> and <u>face masks</u>. If your unit requires them, this procedure will be revised.

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST				
		1	2	3	4	5
A. Preparing for Solution Exchange						
1. Weigh yourself and take your blood pressure.	1. Some doctors prefer that you weigh after you drain. You will get specific instructions on this from your doctor or nurse.					
2. Arrange supplies in order on table.						
3. Bring comfortable chair up to table.						
4. Decide where to place bag to drain.	4. Pole, chair, or floor. (Your dialysis nurse will instruct you)					
5. Remove new bag from warmer. Warm solution will cause less cramping.	5. You can make your own warmer by placing an electric heating pad in a picnic cooler. The electric cord can be made to come out through the cooler's drainage port.					

SOLUTION EXCHANGE PROCEDURE ("BAG CHANGE")

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST 1	2	3	4	5
6. Check new bag for correct solution.	6. The bags all have similar labels. Check carefully. The solution concentration that you choose will depend on your weight and your blood pressure.					
7. Remove outer bag and check bag for leaks. Squeeze bag watching for bubbles of moisture.	7. Some unused bags have leaks; they are contaminated and must be discarded.					
8. Dry inner bag with paper towels.						
9. Remove rolled-up bag from clothing and tuck under arm.						
10. <u>Wash hands</u>. (See procedure.)						

SOLUTION EXCHANGE PROCEDURE ("BAG CHANGE")

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST				
		1	2	3	4	5
B. <u>Draining the Dialysis Solution</u>						
1. Place bag in hanger on pole or chair (some units place on floor).	1. Bag should be lower than abdomen to allow good drainage.					
2. Unclamp tubing so drainage may begin.	2. If catheter is not clogged and is in good alignment, drainage should be finished in 20 minutes.					
3. Drain dialysis solution, watching to see if it's cloudy.	3. Notify dialysis unit staff if solution is cloudy.					
4. Clamp tubing when drainage seems complete.	4. Prevents backflow into peritoneum.					

SOLUTION EXCHANGE PROCEDURE ("BAG CHANGE")

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST				
		1	2	3	4	5
C. <u>Adding Medication</u> If adding medications, it can be done now while draining. New bag is in place on table in front of you. 1. Wipe injection port of new bag with Betadine® or alcohol.	If not adding any medications, tape medication entry port to new bag. 1. Reduces germs.					
2. Withdraw medication from its bottle after cleansing the stopper.						
3. Inject medication into injection port of new bag, (amount will be ordered by doctor).						
4. Tape injection port to bag.						

SOLUTION EXCHANGE PROCEDURE ("BAG CHANGE")

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST 1	2	3	4	5
D. <u>Connecting New Bag</u>						
1. Place old bag next to new bag on clean table in front of you.						
2. Check to see that medication port is securely taped down.						
3. Place clamp on old bag, keeping clamp away from spike.	3. The pressure of the clamp may crack the spike if it closes on top of it.					
4. Soak 4" x 4" gauze square with Betadine®. (Some pre-soaked)						
5. Unwrap old Betadine® soaked 4" x 4" gauze from point of connection of patient tubing to old bag.	5. Be careful that lip of bag <u>does not touch</u> anything.					
6. Remove cover from outlet port of <u>new bag</u>.						
7. If you have been instructed to use sterile gloves during this procedure, put them on now.						
8. Holding clamp tightly, remove spike from old bag.						

SOLUTION EXCHANGE PROCEDURE ("BAG CHANGE")

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST 1	2	3	4	5
D. <u>Connecting New Bag</u> (continued) 9. Holding clamp on the entry port of new bag firmly, insert spike smoothly and quickly. (Must go into center of outlet.)	9. If spike touches anything, <u>stop procedure</u>, clamp tubing and catheter. a. <u>Place spike</u> in Betadine® cup for 5 minutes. b. <u>Call</u> the Dialysis Unit. c. <u>Do not</u> let dialysis solution run in until you have received instructions from the unit on how to proceed. They may want you to add medications at this point or come to the unit.					
10. Unclamp the line on patient tubing set.						
11. Pick up a Betadine® soaked 4" x 4" gauze by the edges, fold in half and wrap around tubing at connection site.	11. Do not touch any part of the 4" x 4" gauze that goes next to the tubing					
12. Wrap a dry, sterile 4" x 4" gauze snugly around the Betadine® gauze at the connection site. (Optional)	12. This dressing stays in place until the next exchange.					
13. Tape this dressing in place. (Optional)						

SOLUTION EXCHANGE PROCEDURE ("BAG CHANGE")

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST				
		1	2	3	4	5
E. Filling the Peritoneal Cavity						
1. Hang dialysis solution as prepared above on hook or pole. Leave plenty of slack with tubing.	1. The bag should hang above the level of the abdomen so gravity can help the inflow.					
2. Unclamp tubing so solution flows into peritoneal cavity.	2. Usually takes about 5 minutes. If there is discomfort, slow the flow.					
3. Clamp tubing just before dialysis solution bag is empty, so air does not enter the peritoneum.	3. Air in the peritoneum can cause discomfort.					
4. Remove bag from hook or pole.						
5. Fold bag in such a way that spike will be inside the folded bag.	5. Protects you and reduces chance of bag puncture.					
6. Fold bag in two or three parts.	6. A compact dressing will be less obvious under your clothing.					
7. Wrap tubing around bag.						
8. Place folded bag in carrying pouch or under clothing.						
9. Note time so you will know when to drain.	9. Frequency of exchange and length of dwell will be prescribed by your physician.					

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST				
		1	2	3	4	5
E. Filling the Peritoneal Cavity (continued) 10. Measure or weigh old bag if instructed to do so.						
11. Take blood pressure, temperature and weight now, if you did not already do so after draining.	11. Weight, with two liters of dialysis solution inside of you, should not be more than 4 1/2 pounds over your target weight.					
12. Take and record blood pressure both lying and standing.						
13. Notify dialysis staff if blood pressure is low on standing.	13. Discuss differences in weight and blood pressure with staff. You may need to make adjustments in strength of dialysis solution used.					

PERITONEAL CATHETER AND EXIT SITE CARE	
<u>Gather Supplies</u> Bottle Betadine® Solution Bottle Hydrogen Peroxide Tube Betadine® Ointment (optional) Sterile Applicators (optional) Sterile 4" x 4"'s Sterile Towel Roll of Paper Tape	Note: This procedure does not use <u>sterile gloves</u> or <u>face masks</u>. If your dialysis unit requires them, this procedure can be revised.

PERITONEAL CATHETER AND EXIT SITE CARE

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST				
		1	2	3	4	5
1. Wash hands. (See procedure)						
2. Open supplies and place items on towel.						
3. Remove old dressing and discard.						
4. Palpate catheter tunnel and cuff.	4. Note any tenderness or swelling or redness.					
5. If your exit site has been draining and a crust had built up around the catheter, use applicators soaked with hydrogen peroxide to remove the crust.	5. Peroxide may be poured directly on the site if there is much buildup of crust.					
6. Wash skin around catheter with soap and water.	6. If you are doing this catheter care after your daily shower or bath, you do not need to wash again.					
7. Rinse completely.						
8. Wash abdomen around exit site with Betadine soaked 4" x 4". Hold catheter up with Betadine® soaked 4" x 4".	7. Handle catheter gently. Do not twise or pull.					
9. Cleanse entire length of catheter with Betadine® soaked 4" x 4", using gentle rotating motion.	9. Work from catheter exit site up to end of catheter.					

ESSENTIAL STEPS	EXPLANATION	PRACTICE CHECKLIST				
		1	2	3	4	5
10. Dry immediate area of exit site with sterile, dry 4" x 4".	10. Avoid scratching or irritating the area. If you note skin irritation, wrap the adapter in a sterile 4" x 4" to lessen its contact with the skin. Open areas of skin allow bacteria to enter.					
11. If the catheter is new, or if there is any drainage from exit site, you may need to apply Betadine® ointment around the exit site.	11. Follow instructions from dialysis staff. (Some prefer to paint the abdomen around the catheter with Betadine® solution.)					
12. Redress with sterile 4" x 4"'s. Secure with paper tape -- allow air to circulate.	12. Curve catheter in smooth loop without any kinks. Do not use any sharp instruments near the catheter. (<u>Do not</u> use scissors to cut dressing.) Always wear clean clothes to reduce possibility of irritation/infection.					

TUBING CHANGE PROCEDURE

<u>Gather Supplies</u> Dialysis solution tubing set Sterile catheter clamp Sterile gloves Betadine® solution Face masks Sterile drapes Sterile 4" x 4" gauze Sterile cups or small trays	This critical procedure involves a long period of disconnection of the patient tubing set and the peritoneal catheter. It is usually done by one of the dialysis staff during an outpatient visit.

ESSENTIAL STEPS	EXPLANATION
<u>To Self-Dialysis Patient</u> <u>Preparation</u>:	<u>To Patient</u>: If you are traveling away from your home, or live a long way from your dialysis unit, you may be instructed to take this procedure to the nearest emergency room.
1. Wash your hands. (See Procedure)	
2. Put on face mask (<u>all</u> persons in room).	
3. Start drainage procedure.	
4. Either you or your assistant can connect new set to new bag of dialysis solution and hang it on the pole.	4. Use established procedure.
5. Prime the tubing set with dialysis solution. Do not let the cotton plug at the end of the tubing get wet.	5. Lets air out of tubing. Chances of contamination are greater if wet.
6. Place end of tubing where it is in easy reach.	
7. Prepare supplies for a sterile procedure.	

TUBING CHANGE PROCEDURE (Continued)

ESSENTIAL STEPS	EXPLANATION
<u>To The Assistant</u> 1. Do five (5) minute surgical scrub of hands and forearms. 2. Drop catheter and tubing on drape. 3. Place sterile drape on abdomen.	<u>To the Assistant</u>: If there is a break in sterile technique at any point, begin again with sterile supplies. * The order of these preparatory steps may vary according to how your "on-off" tray is prepared.
4. Put on sterile gloves.* 5. Do one (1) minute scrub of connection with Betadine® soaked gauze. (May use surgical brush.) 6. Do one (1) minute scrub of peritoneal catheter with Betadine® soaked gauze. 7. Place the two Betadine® soaked gauzes at the catheter exit site after scrubbing. 8. Place a dry sterile 4" x 4" gauze under the connection so it does not touch the drape when you put it down. 9. Repeat one (1) minute scrub of catheter from connection to exit site. 10. Soak connection in sterile cup (or small tray) of Betadine® solution for five (5) minutes.	

TUBING CHANGE PROCEDURE (Continued)	
ESSENTIAL STEPS	EXPLANATION
11. Hold tubing up and place on top of another dry, sterile 4" x 4" gauze.	
12. Put sterile catheter clamp on catheter and close.	12. Draining fluid would contaminate entire field.
13. <u>Change sterile gloves</u>.	13. <u>You are about to open the connection and need to start this portion of procedure with new sterile gloves</u>.
14. Take sterile drape and fold in half.	
15. Make 4" tear in drape down the folded middle.	15. Drape will be used to go around catheter later.
16. Put drape on abdomen with slit side next to catheter.	
17. Hold catheter and tubing with dry, sterile 4" x 4" gauzes.	17. Dry 4" x 4" gauzes will give you a better grip on the wet tubing.
18. Disconnect tubing set from catheter adapter. Discard it.	
19. Position new drape so that it fits around the catheter.	
20. Place open end of catheter in Betadine® filled cup to soak for five (5) minutes.	
21. After 5 minutes, remove protective covering from patient end of tubing set. Use 2 dry sterile 4" x 4" gauzes.	

TUBING CHANGE PROCEDURE (Continued)	
ESSENTIAL STEPS	EXPLANATION
22. Connect tubing set to catheter adapter. Make sure it is a tight fit.	22. If you should ever disconnect accidentally, you must start procedure from the beginning with sterile technique.
23. Cover plastic adapter with protective dressings.	23. If you have the titanium double-seal locking connector, it does not need to be covered with dressings.
24. Remove catheter clamp.	
25. Remove drapes.	
26. Open clamp on tubing set and fill abdomen with fluid.	26. Filling usually takes about 5-10 minutes.
27. Complete solution exchange procedure.	

section four

index, glossary and references

INDEX/GLOSSARY

INDEX/GLOSSARY*

Abdomen -- part of the body between the chest and the pelvis (7)

Access -- A way to get into the body; for hemodialysis you need access to the blood stream; for peritoneal dialysis you need access to the peritoneal membrane.

Ace bandages -- a strip or piece of elastic gauze or other fabric for wrapping a joint (HP-9)

Adsorptive Filters -- a type of filter used for water treatment that holds on to certain liquids and gases (138)

Air detector -- an alarm system which activates if it detects air in the blood tubing or hemodialysis system (103, 110, 111, 120)

Air embolism -- obstruction of a blood vessel by an air bubble (203)

Air infusion (HP-38)

Alcohol (123, 152, 226)

Alcohol prep -- thorough cleansing of an area with gauze soaked in alcohol; prep pads (HP-8)

Allergy -- hypersensitivity to a physical or chemical substance (HP-7)

Ambulatory -- able to walk, movable (23)

Amino acids -- one of the key substances found in proteins and which are important for growth and nutrition (54)

Amphojel -- a phosphate-binding agent needed to keep calcium and phosphorus in balance in the body (57, 65)

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* Page numbers appear in parentheses. HP preceding a number indicates Hemodialysis Procedure section, and PP preceding a number indicates Peritoneal Dialysis Procedure section.

Analgesics -- medication used for pain. Common analgesics used are Tylenol and Darvon (64)

Androgens -- male hormones. They are used to either increase or maintain one's red blood cell count (64)

Anemia -- low red blood cell count (163, 165-166, 241-242)

Aneurysm -- enlargement of a section of a blood vessel (180, 181)

Angina -- chest pain (200)

Antacids -- medications which relieve gas pain. Mylicon is a commonly used antacid. Do not use antacids which contain magnesium (65)

Antibiotics -- medications used to fight infection (230)

Anticoagulants -- medications which help prevent blood clotting (65)

Antihistamines -- medications which may relieve certain allergic conditions (169, 249)

Antihypertensives -- medications which control high blood pressure (65)

Antipruritics -- medications which are used for relief of itching (65)

Apical pulse -- pulse over heart (71)

Arrythmia -- irregular heart beat (166, 242)

Arterial blood tubing (104, 110, 111, 112)

or

Arterial line -- the blood tubing that carries blood from the body into the artificial kidney (104, 110, 111, 112)

Artery -- blood vessel carrying blood from the heart to all parts of the body (71)

Artificial Kidney -- another term is hemodialyzer. It is part of the system where the actual dialysis occurs (103, 107, 125)

Aseptic (143) SEE STERILE

Aseptic technique (143) SEE STERILE

Azotemia -- clinical condition of advanced kidney failure, nitrogen waste products are retained in the blood (90)

Bacteria -- (SEE STERILE FIELD) microscopic organism usually associated with infection, germs (143)

Barrier towel -- sterile field created by sandwiching a plastic liner between two paper towels and preventing water from penetrating the surface (PP-6)

Bath -- dialysate solution made by mixing part dialysate concentrate with part water (109)

Beta cap -- special connective device containing Betadine which prevents contamination of the tip of the peritoneal catheter (PP-18, PP-21)

Betadine -- a commonly used disinfectant (143, 225)

Bevel -- slanted edge of needle which allows easy penetration of the skin (119)

Bilirubin level -- a pigment produced by the breaking down of the hemoglobin and found in the blood serum (174)

Bleach -- used as disinfectant in dialysis machines

Blood chemistries -- measurement of certain chemical forms in the blood (77-78)

Blood compartment -- one of the sections in the dialyzer separated by a membrane (39, 125)

Blood flow rate -- speed of blood to or from the dialyzer (127, HP-6)

Blood leak detector (142, 190-193)

Blood line connectors -- short piece of blood tubing which will allow connection of shunt to blood line without stretching shunt (HP-9)

Blood pathway alarms -- arterial and venous pressure alarms which warn of obstructions to blood flow (194-197)

Blood pressure -- measures the pressure in the heart and blood vessels in the body (55, 73, 76)

Blood pressure cuff -- part of the blood pressure machine which is wrapped around the arm (73-76)

Blood pump -- moves the blood through the dialyzing system (103, 110)

Blood transfusion -- introduction of blood into the body circulation (77)

Blood tubing -- carries the blood from the hemodialyzer to and from person (104, 110, 111, 112)

Blood urea nitrogen (BUN) (78)

Bolus (149) SEE HEPARIN DOSE

Bone disease -- demineralization, usually as a result of high phosphorus (163, 166, 239, 242)

Bone marrow -- material within bones which have to do with the production of red blood cells (165, 241)

Bovine graft -- specially prepared piece of carotid artery of a cow (bovine) used to join an artery with a vein (107)

Brachial artery -- blood vessel distributed in shoulder, arm, forearm and hand (71)

Bridge tape -- protective connective tape which reduces chance of accidental line separation (PP-12)

Bruit -- the vibration or buzz felt over the venous side (105, 115)

Bulldog clamps -- small clamps usually used to clamp shunt cannula (124)

"Butterfly" -- soft, plastic wings on either side of the fistula needle; gives you a firm handle to hold on to the needle (119)

By-pass -- automatic reaction of some dialysis delivery systems; the dialysate does not circulate to the dialyzer (artificial kidney) (120)

Calcium -- a mineral obtained mainly from dairy products and meat in a diet. It is necessary and important to form strong healthy bones (56, 65, 78)

Calcium supplements -- may be prescribed if a person is not able to keep enough calcium in his blood (65)

Calories -- needed to maintain an adequate body weight. The three types of food which supply calories are carbohydrates, protein, and fat (56)

Cannula -- term frequently used to refer to the silastic and teflon arteriovenous shunt (105)

Carbohydrates -- organic compounds such as sugar and starches (56)

Carbon filters -- the most commonly used absorptive filter (138)

Cardiac drugs -- prescribed to help with diseased hearts (65)

Carotid artery -- blood vessel which supplies blood to neck, face and skin (71)

Catheter -- a flexible, hollow tube (207, 208, 21(, 221, 225)

Catheter tunnel -- area of tissue occupied by the peritoneal catheter (256)

cc -- cubic centimeter, often used as the equivalent of one milliliter (54)

Chemistries -- term used to indicate a group of blood values; examples: potassium, sodium, chloride, calcium, phosphorus (77, 78)

Chloride -- chemical element contained in salt (78)

Chloride test -- test for proper conductivity of dialysate bath solution

Chronic renal disease (48) SEE END STAGE RENAL DISEASE

Chux -- lined protector (229)

Clamps -- instruments which are used to close off flow; examples: bull dog, hemostat, roller-clamp (124, 167)

Clean -- term used for laundered or washed items or objects. They are <u>not</u> sterile (143-146, 223-229)

Clot -- small semisolid mass of coagulated blood (65, 81, 115, 124)

Clotting tube -- a type of blood tube without reagent which allows a clot of blood cells to separate from the serum (81)

Coiled tube -- one of the basic dialyzer shapes (125, 126)

Colace -- stool softener used to prevent constipation (66)

Concentrate -- electrolyte solution which needs to be diluted to make dialysate bath

Conductivity -- ability of an electrolyte solution to carry an electrical charge (17, 120)

Conductivity meter -- device which monitors concentrates of electrolytes in a solution (17)

Connector -- part of a shunt; cylindrical teflon piece which holds shunt cannulae together by friction (105)

Contaminated -- when a sterile object is made unclean, for example, touching the sterile object with an unsterile one (144, 145, 225, 227)

Continuous Ambulatory Peritoneal Dialysis (CAPD) -- treatment which allows the patient to carry on daily activities with dialysis solution present in the abdomen. Fluid exchanges take place every four hours but do not require equipment connection (8, 19, 23, 211, 213)

Coring -- removal of a small section of skin or tissue when using large needles for venipuncture (HP-17)

Creatinine -- a continuous breakdown product of muscle metabolism used as an indication for dialysis (78)

Culture -- to take a representative sample of organisms from a wound site (258)

Dialysis treatment plan -- regimen based on the needs of the patient which reestablishes physical balance (63)

Dialyzer -- piece of equipment comprising a blood compartment and dialysate compartment which are separated by a semi-permeable membrane (107, 125)

Diaphragm -- resonant material on the stethoscope which carries the sound of the pulse to the ear

Diastolic pressure -- the minimum force exerted by the bl-od against the vessel walls, the heart's resting phase (73)

Dietitian -- helps the patient choose a nutritious but palatable diet in keeping with his treatment restrictions and kidney function (14, 53)

Diffusion -- movement of particles from an area of high concentration to an area of low concentration until balance is achieved (108, 215)

Disinfection -- reduces the number of organisms, but does not destroy them all (143, 225)

Dose -- the amount of a therapeutic agent to be given at one time (149)

Drainage -- liquid leaving the peritoneal cavity; liquid leaving from a wound site (255, 256, 262)

Dressing -- covering over a wound usually made with sterile materials

Drip chamber -- portion of a blood line intended to catch air bubbles and allow observation of blood flow (80, 188)

Dry weight -- weight at which the person is as normotensive as possible without blood pressure medicine, and free of edema in the extremities and lungs (72)

Deionization -- removes all impurities from water (138)

Delta pressure -- arterial pressure minus venous pressure (195)

Dextrose -- simple sugar used to maintain proper blood sugar levels in hemodialysis and to create osmotic pressure in peritoneal dialysis (216)

Diabetes -- disorder of insulin metabolism resulting in abnormal sugar metabolism (48, 58, 217)

Dialysate -- a solution made by mixing part concentrate with part water (108, 109, 231)

Dialysate alarms -- sensors which detect unacceptable ranges of conductivity, temperature, and the presence of blood (141)

Dialysate compartment -- that area separated from the blood through which the dialysis bath travels (39, 125)

Dialysate delivery system -- machine responsible for mixing or proportioning bath and maintaining its temperature (108)

Dialysate flow meter -- device for observing speed of dialysate flow

Dialysis -- a treatment for kidney failure which separates most unwanted substances from the blood and adds some needed substances by the use of osmosis, diffusion, and ultrafiltration (7, 39, 49, 215)

Dialysis fluid exchange -- regimen used in peritoneal dialysis which insures proper fluid and waste removal

Dialysis flow sheet -- record of pertinent information regarding the patient's treatment which is used to improve his care (HP-2, PP-2)

Dwell -- length of time peritoneal dialysis solution stays in the peritoneal cavity (109)

Edema -- puffiness or swelling due to excess fluid (56, 164)

Effluent -- solution draining out of the peritoneal cavity during exchange (PP-4)

Electrolyte -- elements with electrical charges; need to be balanced in the body (90)

End-stage renal disease -- kidney failure (48)

Enzymes -- an organic catalyst (174, 250)

Exit sites -- place where shunt cannulae or peritoneal catheters exit the skin (105, 255, 262)

Fibrin -- a protein necessary for the clotting of blood (183)

Fibrin clots -- masses of fibrin material which clog catheters

Filtration -- to move fluid through a membrane or screen as a result of pressure (128, 216)

Fistula -- surgical uniting of an artery and a vein beneath the skin allowing arterial blood to continuously enter the vein (106, 115)

Fistula needles -- large bore needles used to remove and return blood during hemodialysis (119, 121)

Fistula venipuncture -- use of large bore needle to enter the fistula to gain blood access

Flat sheet -- type of dialysis made of long parallel pieces of semi-permeable cellophane-like material (125)

Flow rate -- speed of flow of either blood or dialysate

Fluids -- fluids in the diet include anything which is liquid at room temperature. This includes Jello®, soup, sherbert, ice cream, and ice (55)

Fluid overload -- point where extra water in the body creates edema, difficulty breathing, or extra work for the heart

Forcep -- a sterile instrument used to pick up materials without contaminating them (HP-9)

Formaldehyde -- a common chemical agent used for preservation and sterilization (143)

Gauge -- size; the smaller the gauge the larger the size (147)

GI -- gastro-intestinal system (204)

Gm -- gram (54)

Graft -- any material used for connection or repair of tissues (104)

Graft fistula -- surgical use of synthetic or animal material to connect an artery with a vein; the graft is used for venipunctures (107)

HB_s AG -- hepatitis B surface antigen; antigen present in the blood of persons who have hepatitis

Hemastick -- a specially treated strip which is used to test for the presence of blood; will turn blue if blood is present (174, 192, 250)

Hematocrit -- the percentage of blood which is made up of red blood cells (90)

Hematoma -- bruise created by the movement of blood from the veins into surrounding tissue due to trauma or piercing a vessel wall (180, 181)

Hemodialysis -- the removal of fluid and waste products from the blood across a semipermeable membrane by using the principles of diffusion and ultrafiltration (5, 22, 39, 103-112)

Hemodialyzer -- apparatus which allows the separation of blood and dialysate by using a semipermeable membrane thus allowing dialysis to occur (103)

Hemolysis -- breaking open of red blood cells usually by the use of excess heat or pressure or by using a hypotonic solution (203)

Hemostat clamps -- clamps used to stop blood flow (112)

Heparin -- medication which keeps the blood from clotting (148, 149)

Heparin infusion line -- line which connects a supply of heparin to the blood lines during hemodialysis allowing constant infusion (148, 149)

Heparin loading dose -- amount of heparin given at the beginning of hemodialysis to prevent the clotting of the dialyzer (149)

Heparin pump -- machine which administers a slow constant amount of heparin through the infusion line into the blood circuit (103, 148, 149)

Hepctitis -- inflammation of the liver (173, 249)

High biologic value -- food possessing all essential amino acids (54)

Hollow fiber -- fine threadlike cylinders made of semipermeable material through which blood travels during hemodialysis (126)

Hydrogen peroxide -- solution which dissolves blood (HP-9)

Hyperkalemia -- high potassium level (164, 240)

Hypertension -- high blood pressure (164, 240)

Hyperthermia -- above body temperature (203)

Hypertonic -- more than usual concentration (186)

Hypotension -- low blood pressure

Hypotonic -- less than usual concentration

Infiltration -- penetration of vessel wall by a needle allowing the movement of blood into the tissues and subsequent bruising (180, 181, 196)

Inflammation -- reddening, swelling and increased local temperature usually as a result of infection or irritation

Inflatable cuff -- an apparatus such as a blood pressure cuff which is used to circle the arm and create pressure when inflated (74)

Inflow -- movement of fluid into a compartment or cavity

Inflow dialysate hose -- hose which channels dialysate from the proportioning unit to the artificial kidney (110, 111)

Infusion -- slow, constant administration of medication or solution

Infusion pump -- machine used to insure constant administration of solution (149)

Injections -- administration of medication by use of a needle and syringe (153-155)

Intermittent peritoneal dialysis (IPD) -- the initiation and completion of peritoneal dialysis on a scheduled basis (as distinct from CAPD) (7, 23, 211)

Intra-muscular -- in the muscle; many injections are given this way (153)

Ion Exchange Resins -- remove potassium from the body by exchanging with sodium (66)

Iron -- trace elements necessary for the making of red blood cells but dangerous in large quantities (66)

KCL -- potassium chloride, electrolyte solution used to increase dialysate potassium levels for those whose serum potassium levels are low (230)

Kerlix -- stretchy gauze wrap used to cover dressings (HP-9)

Kidneys -- organs which are primarily responsible for removing water and waste products from the blood and excreting them as urine (47)

Kilogram -- metric weight, equivalent to one liter of fluid weight or 2.2 pounds (133)

Lanolin -- fatty substance obtained from wool used as a base for ointments and lubricants (169, 245)

Laxatives -- help prevent constipation (11)

Lidocaine -- xylocaine, medication used as a local anesthetic which may have cardiac effects if given intravenously (HP-16)

Line separation -- disconnection of blood lines resulting in interruption of blood circuit to or from the dialyzer and possible blood loss

Low biologic value -- having some but not all essential amino acids (54)

Magnesium -- trace element necessary for normal body function but dangerous in high concentrations (78)

Manometer -- gauge which transfers pressure to a number equivalent

Membrane -- a thin, soft, pliable layer of tissue or material used as separation or covering (39, 108, 207)

mEq -- milli-equivalent; small unit of metric measurement used to express minute levels of a substance in the body (54)

Micron -- one millionth of a meter, or a particle having that diameter (133, 137)

Micro-organisms -- an organism not visible without the aid of a microscope (143, 223)

Minerals -- non-organic substances necessary to normal body function but toxic in high concentrations (55)

ML -- milliliter, one one-thousandth of a liter; often used interchangeably with cc (54)

mmHG -- millimeter of mercury; used as a measure of pressure, e.g., 120 mmHg pr. is the amount of pressure necessary to raise a column of mercury 120 millimeters

Modified Lee-White -- test for speed of blood clotting which is easier, though less accurate, than the standard Lee-White

Molecules -- smallest particle of an element which retains the characteristics of the element (125)

Nausea -- upset stomach (49)

Needle sticks -- inserting needles into fistula (233)

Negative pressure -- suction created by the dialysate compartment which causes fluid movement across a semipermeable membrane (17, 120)

Nephrologist -- a physician who specializes in treatment for patients with disturbances of kidney function (13)

Neuropathy -- tingling and irritation of the fingers and toes associated with slowed motor nerve conduction in some persons with bad kidneys; specific cause not defined (168, 244)

Nutrition -- food to sustain the body (91)

Occluded -- closed off or obstructed (PP-23)

On-call system -- arrangement by which staff members are available 24 hours a day on a rotating basis in order to aid in solving medical or treatment problems

Optimum weight -- desired weight; weight which the patient and treatment team determine is best for the patient

Oral temperature -- record of body heat measured by putting the thermometer in the mouth (70)

Osmosis -- movement of water across a semipermeable membrane from an area of low particle concentration to an area of high particle concentration (216)

Outflow -- movement of fluid out of a compartment or cavity

Outflow dialysate hose -- hose which channels the dialysate out of the artificial kidney (110, 111)

Oz -- ounce (54)

Palpation -- to examine by touching (221)

Parathyroid glands -- responsible for monitoring serum calcium levels and for producing parathyroid hormone (48)

Parathyroid hormone -- causes calcium uptake from bones, increased excretion of phosphorous, increased intestinal absorption of calcium (57, 167, 243)

Pericarditis -- inflammation of the lining around the heart (165, 241)

Peritoneal catheter -- tubing inserted through abdominal wall to peritoneal cavity which allows inflow and outflow of solution (207, 219)

Peritoneal cavity -- that body area between the thoracic cavity and the pelvis which contains the abdominal organs (213, 219)

Peritoneal dialysis -- removal of wastes and fluid from the body by using the peritoneal membrane as the separator of blood and dialysate solution (7, 23, 40, 207-214)

Peritoneal membrane -- semipermeable lining of the abdominal cavity and its organs (40, 207)

Peritoneum -- same as peritoneal membrane (207)

Peritonitis -- inflammation of peritoneal membrane due to infection or irritation (257)

Peroxide (HP-9_ SEE HYDROGEN PEROXIDE

Phisohex -- soap which when rinsed off leaves a residue which slows the growth of germs

Phosphate binders (57, 66)

or

Phosphate-binding agents -- medications which combine with the phosphorus in flood and prevent phorphorus absorption (57, 66)

Phosphorus (P) -- a non-metallic chemical agent necessary for normal body function, especially bone formation (56)

Porous membrane -- layer of material with small holes which allows passage of certain substances (39, 108, 207)

Positive pressure -- back-up pressure created by forcing blood across the membranes of the artificial kidney (130)

Potassium (K) -- a metallic element important for muscle contraction (55)

Power outage -- condition where insufficient electricity prevents operation of equipment

Pressure -- force exerted against an opposing body, usually vessel walls or dialyzer membranes (128)

Pressure gauge -- instrument which translates force into a numerical reading in measuring pressure

Pressure meter -- SEE PRESSURE GUAGE

Protamine -- an anticoagulant which when combined with heparin counteracts its anticoagulant effect

Protein -- an essential nutrient used to build body tissues (54)

Pruritis -- itching (65)

Psychosocial -- psychological and social aspects of a person's life (91)

PTFE graft -- polytetraflouralethyline; expanded teflon used in synthetic grafts such as Gortex® and Impra® (92)

Pulse -- rhythmic throbbing of an artery felt where it nears the skin surface, usually corresponds to rhythm of heart rate (69, 71)

Pulsations -- rhythmic changes in pressure corresponding to heart contractions (73)

Puncture -- hole made by a sharp point such as a needle

"Push" dose (149) SEE HEPARIN LOADING DOSE

Radial artery -- vessel which carries blood from the brachial artery to the thumb side of the hand (71)

Red blood cells -- oxygen carrying cells of the blood (39, 165, 241)

Renal diet -- pattern of eating which is restricted based on amount and type of kidney function and which does not exceed the body's tolerance (53)

Respiration -- the movement of air in and out of the lungs (72)

Reverse osmosis -- creation of pure water by squeezing regular water through a fine filter (138)

Rinse -- the amount of saline necessary to flush blood out of the artificial kidney back to the patient without undue blood loss (230)

Rupture -- break, usually a hole in a semipermeable membrane of the artificial kidney which allows blood and non-sterile dialysate to mix (190)

Saline -- a sterile salt water preparation containing .9% sodium chloride (148, 150)

Saline infusion -- slow administration of saline solution

Sedation -- reduction of excitement or irritation of patient with the use of medication (66)

Sedimentary filter -- removes sediment and particles from water; used to make dialysate (137)

Seizure (or convulsion) -- uncontrolled nerve impulses which cause muscle contraction; an occasional side effect of rapid dialysis (201)

Self-dialysis -- performance by the patient or helper of most or all treatment procedures related to hemo or peritoneal dialysis (21-23, 27, 40-44)

Self-venipuncture -- putting in one's own fistula needles (117)

Semi-permeable membrane -- membrane with holes of a size which permits passage of small particles while excluding larger ones (39, 108)

Sensitivities -- substances to which an individual's body may respond in a dangerous or unpredictable way

Shunt -- pliable plastic tubing which connects an artery to a vein, exits the skin and may be separated to allow blood access (104)

Shunt clamps -- clamps used to prevent blood loss when shunt is separated (HP-9)

Silastic -- special type of plastic which the body does not reject easily. Used for arteriovenous shunts (105)

Silastic tubing -- type of tubing used for shunts (105)

Simulated -- a situation set up to practice a skill (19)

Sodium (Na) -- metallic element found commonly in the body, usually associated with water retention (54)

Sodium chloride -- table salt, a common form of sodium (150)

Spasm -- uncontrollable contraction of muscle, usually vessel contraction associated with irritation

Spike -- the pointed end of the solution transfer set used for peritoneal dialysis (210, 229)

Steal syndrome -- sensation of numbness or tingling of the access extremity due to change in blood flow

Sterile -- free from living microorganisms (143, 223)

Sterile drape (145, 227)

or

Sterile field -- area which is free of living microorganisms and may be used to hold other sterile items without contaminating them (145, 227)

Sterilization -- elimination of all living microorganisms (143, 225)

Stethoscope -- instrument for transmitting heart contractions into sounds that may be heard (73, 105)

Stools -- bowel movement (162, 238)

Stool softeners -- medications which prevent constipation and irritation of dry bowel movements by keeping them moist (66)

Synthetic -- artificial; man-made (104)

Syringes -- a device consisting of a barrel and plunger which is used to inject solutions through a needle into the body (147)

Systolic pressure -- force exerted against the vessel walls as a result of heart contractions (73)

Teflon -- non-stick material used in shunt connectors (105)

Teflon shunt connector -- cylindrical tube used to hold shunt cannulae together by friction (HP-9)

Temperature -- measure of body heat (69, 70)

Testosterone -- anabolic steroid often used to increase red blood cells (64)

Titanium -- metal used in adapter which connects peritoneal catheter to solution inflow line (219)

Topical -- describes medication applied to the skin (65)

Tourniquet -- stretchy material used to prevent venous blood flow causing vessel distention and easier venipuncture (119)

Tranquilizers -- medication used to quiet or calm (66)

Transmembrane pressure (TMP) -- total force necessary to move a specific amount of water across a semipermeable membrane (129, 131)

Transplant -- surgical procedure which places a donated kidney into the body; alternative treatment to ESRD (8, 27)

Trauma -- injury or wound

Troubleshooting -- solving mechanical or treatment related problems by a process of elimination (199-204, 261-263)

Tubing change schedule -- routine established for changing the inflow and the outflow tubing used in CAPD (PP-18 - PP-21)

Tunneling -- creating a hole through the tissue as in the tunnel occupied by the peritoneal catheter

Ultrafiltration -- movement of fluid across a semipermeable membrane as the result of pressure (127, 216)

Urea -- a nitrogen byproduct of metabolism usually eliminated in the urine (7)

Uremia -- build-up of waste products to a level which adversely effects body function (263)

Vascular access -- means by which blood is supplied to the dialyzer during hemodialysis (42, 89)

Vein -- vessel which returns blood to the heart (104)

Veni-puncture -- introduce needle into blood vessels (17)

Venous line (111, 112)

or

Venous blood tubing -- tubing which returns blood from the dialyzer to the patient (111, 112)

Venous drip chamber -- reservoir which catches air bubbles and prevents their return to the patient (188, 196)

Venous sleeve -- area of venous line through which medications may be administered; blood for clotting times obtained (81)

Vessel dilation -- enlarging and expansion of a vein as a result of heart or pressure

Vessel resistance -- amount of rigidity or tone of vessel walls which determines blood pressure and venous pressure

Vials -- small bottle used to hold medicines (149)

Vital signs -- temperature, blood pressure, pulse, respirations; signs which indicate the body's stability (69)

Vitamins -- organic material found in many foods, necessary in small amounts for proper body function (67)

Volume expander -- substance which adds directly or indirectly to the circulating blood volume

Waste products -- chemicals and electrolytes usually eliminated after normal metabolism (7)

Water softening -- method for removing calcium and other chemicals from water used for making dialysate (138)

Water treatment -- method of preparing water of sufficient purity to use for making dialysate (137)

White blood cells -- cells which fight infection in the body (39)

Xylocaine -- used to numb the arm for the fistula needle "sticks" (119)

"Y" -- segment where a saline line joins the blood lines which allows fluid replacement during hemodialysis (HP-10)

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      Instructor's Guide
      Trainee Guide
      Flip Chart
      Check Lists

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      Check List

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System 4215/16 Filmstrip Program
System 7000 Filmstrip Program
System 6010 Filmstrip Program

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